DEFENSE INDUSTRY BULLETIN

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IN THIS ISSUE

American Industry and the Logistic Bridge to our Fighting Man 1
A Self-Appraisal for Project Managers 3
COIN 7
An Overview of Air Force Procurement 10
The Specification Approach and SAIMS 15
Educational Technology 16
Project AIMS 19
Military Information Processing—Heart of Command and Intelligence Systems 36

DEPARTMENTS

About People 9
Bibliography 14
Calendar of Events 18
Speakers Calendar 21
Meetings and Symposia 24
From the Speakers Rostrum 25
Defense Procurement 42

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Logistics in Vietnam

"This conflict will take the best we have—the finest men and the equipment best suited for the job—and to do it also takes the best logistical system in the world. . . . About a million different kinds of items are needed to suppy our Army today. . . All these items must be designed, tested, manufactured, packed and shipped to a water port in-country and, finally, delivered to the men at the triggers of the weapons—and many of the vital links in the logistics chain are civilian industrial links not military ones." —Lieutenant General L. J. Lincoln, USA, Deputy Chief of Staff for Logistics, U. S. Army.

See article, "American Industry and the Logistic Bridge to Our Fighting Man," beginning on page 1.

Deadlines for Christmas Gifts Sent Overseas Announced

To insure prompt delivery of Christmas gifts sent to servicemen stationed overseas, the Post Office Department urges that all packages sent by regular postage be mailed by November 10 and all air mail parcels be sent no later than December 10.

Parcels addressed to servicemen in Vietnam that weigh no more than five pounds and measure no more than 60 inches in length and girth combined may be mailed at the ordinary postage rate and be transported by air on a space-available basis between San Francisco and Vietnam.

There are at present no plans for a special Defense Department airlift of bulk collections of Christmas gifts for servicemen this year.

The Post Office Department cautions that gifts should be securely packed in cartons of wood, metal, or double-faced corrugated fiber board and that fragile items be surrounded by cushioning materials such as excelsior or shredded paper.

Matches, lighter fluid and similar flammable items are prohibited from the mails. Check with your local post office for details of these and other restrictions as well as size and weight limitations applicable to mail destined for certain geographic areas.

To insure the safe arrival of gifts, packages should be wrapped securely and the addresses written correctly and legibly using the appropriate five-digit APO or FPO number as part of the address. As an added assurance, place a duplicate label, which plainly shows both the addressee and the return address, inside the package.

Mail intended for an unspecified addressee will not be accepted. Mail for servicemen must be addressed to a named individual or to a specific military unit.

Army R&D Labs Get Microfilm Storage Facility

The U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., have opened a new micro-reproduction storage, retrieval and reproduction facility for handling engineering drawings and associated technical data. The system also features an instantaneous data link with the parent organization of the laboratories, the U. S. Army Mobility Equipment Center in St. Louis, Mo.

In the facility, drawings and associated data pertaining to military engineer equipment, developed and engineered by the laboratories for procurement, are microfilmed and mounted in 35mm aperture cards. Additional duplicate cards and large-size prints are reproduced automatically. Word information on the cards may be transmitted instantaneously as hard copy print-out, or as punched card duplicates, to St. Louis where complete procurement packages on the equipment are distributed to bidders and contractors.

Designed to improve the preparation of bid and procurement packages, the use of microfilm provides a 95 percent reduction in paper volume. The microfilm also permits further reproduction of extra copies for manufacturing, purchasing, or other needs.

The new micro-reproduction facility is located in the Production Engineering Division of the laboratories' Engineering Department.

DEFENSE INDUSTRY

BULLETIN

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The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, OXford 5-2709.

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American Industry and the Logistic Bridge to Our Fighting Man

The following is taken from a briefing for representatives of business and industry given by Lieutenant General L. J. Lincoln, USA, Deputy Chief of Staff for Logistics, U. S. Army.

Through nine major wars and countless minor actions the industry-military team has functioned in support of our national policy and national defense. We in the Department of Defense are conscious of the tremendous and vital contributions to our past victories that the industry half of the team has made.

Today our military strength, backed by the producers of this nation, is committed, with other free world forces, in still another war. To the soldier it is just that—war, whether or not it is a declared one—a dirty war, fought under the hazards of constant heat, drenching monsoons, or gritty dust against an almost unseen enemy who has 20 years of conflict behind him. It is the third war for this generation of Americans. This conflict will take the best we have—the finest men and the equipment best suited for the job—and to do it also takes the best logistical system in the world.

Logistics has long been a science and is becoming to some extent an art in the modern world. The requirements to support our forces on a world-wide scale become staggering and resolve themselves into military demands on our economy—all facets of the economy. The job of supplying a rifleman in a paddy field, or in a field of elephant grass almost 9,000 miles away from the production base, makes great demands on logistical enterprise. This enterprise is by no means a purely military one. About a million different kinds of items are needed to supply our Army today to include those who are fighting in the deltas and highlands of Vietnam. About half of these items are procured by the Defense Supply Agency. All these items must be designed, tested, manufactured, packed and shipped to a water port or airfield in-country and, finally, delivered to the men at the triggers of the weapons—and many of the vital links in the logistic chain are civilian industrial links, not military ones. Thousands of contractors all over the United States are deeply involved in the various elements I've mentioned. I don't mean to imply that American industry is not frequently located close to the troops it supports. American industry is in range of Viet-Cong guns in Southeast Asia today. I received a letter from a civilian friend who works for an American contractor in Vietnam who is constantly with in range and subjected to Viet Cong fire. However, there is a military logistic bridge even there. Military logistics must plan, budget, contract and administer.

I said we depend on industry and you may well ask how. I'll mention some of the ways we depend on you—the business men of American industry.

We depend on you to produce the best possible product at the most reasonable cost, thus providing a major part of the base for our military power. In such production, we would expect you to apply the principles of human engineering, systems analysis and the most modern techniques the state of the art will allow, no matter what the product or service. While a competitive market normally promotes such practices, we seek a special effort for reasons of economy of the taxpayer's dollar, quality and utility of the product and reduction of lead times. The soldier at the front is affected.

It may sound like a platitude or I may sound like a contracting officer, but we really do depend on you to meet scheduled production dates and quantities. Late deliveries cause us problems that extend far beyond the technicalities of contract performance and cause us problems in our combat operations. We have some items that are now badly needed in Vietnam wherein the contract is over a year behind scheduled deliveries.

We depend on you to develop and apply packaging that is most resistant to damage, heat, humidity, shock and, in the case of Vietnam, ten thousand miles of traveling followed by prolonged exposure to monsoon weather, dust and the roughest of handling.

We are dependent on industry to furnish an ever increasing amount of supporting contractual services in Vietnam.

Ration breakdown and storage area at Cam Ranh Bay in South Vietnam.

Those are some of the major ways in which those at the far end of the logistic bridge must rely on U.S. industry. It is military logistics that links this vast industrial machine to our fighting forces. Perhaps I should say "business," since the term industry, to many people, creates visions of great industrial complexes like General Motors or U.S. Steel. We do depend on them, but we are just as deeply indebted to thousands of smaller businesses who furnish components as well as end items.

The logistic bridge I've described is relatively broad and smooth at this end, mostly due to the years of our successful team effort, but at the far end—the one in Vietnam—conditions make it rough.

I'd like to talk about some of these rough aspects, since they relate directly with the ways in which the Army depends on you.

Before our buildup began, the port of Saigon, crowded and behind the times as to methods, was inadequate to meet the discharge requirements. It was really the only port in South Vietnam. The terrific increase in shipping required the United States to build new ports—six of them—to support the new troop strength. This was in addition to extensive expansion in Saigon itself. A tremendous effort by Army engineer units, the Navy Seabee units, as well as civilian contractors, both U.S. and allied, plus extensive use of lighterage and increasing use of De Long-type piers, has resulted in port facilities now keeping pace with the military requirement. However, much remains to be done. There is a related problem in capacity for handling cargo for non-military purposes. This non-military cargo often becomes quite important, but is not normally handled by military facilities.

The climate in Vietnam, you might say, runs the gamut from bad to worse—if it's not monsoon rains in the lowlands, it's foot-deep dust in the highlands. This puts terrific strain on equipment, most of which has to be operated across the whole range of adverse conditions on a practically 24-hour-day basis when combat operations are under way. The same conditions affect textile products such as uniforms and tents. I'm told that the threads used to stitch our standard combat boot can disintegrate in a matter of days. We are, therefore, furnishing our new jungle boot as rapidly as possible. It has a sole moulded rather than stitched to the uppers. This is what I referred to when I said we depend on you to provide equipment that can stand up to this sort of weather and terrain.

Today's combat in Vietnam requires large tonnages of bombs, bullets, rations and, in all, perhaps a million items. It aggregates now over 300,000 short tons a month of which about two percent move by air.

In the ultimate, the war there is not one of tons and statistics, but rather is one of close combat. The individual soldier has the lonely and hazardous task of finding the elusive enemy and defeating him. He must seek him out in the deep jungles and hidden tunnel complexes. He must destroy the enemy's weapons, factories, food and equipment that he finds there. He must face an enemy that in 1959 consisted largely of guerrilla squads, but today consists of organized regiments. Our own forces have built up with this increasing threat. In the end the military control that we seek is not achieved by tons of supplies, but by the courage and readiness of that soldier to face the enemy and defeat him. Our logistic bridge to support him, however, is a vital link and without it he will be helpless. It is over 19 days sailing from the west coast. There is also the lead time in the procurement and production phases. We must today start on things needed a year from now. The fighting man's rations, shelter, equipment and ammunition a year from now are all dependent on what we are doing today.

Problems in our production base back here can cause even more serious problems for the soldier at the front if they do not produce the needed

(Continued on Page 35)

An Army UH–1B helicopter lands supplies at isolated outpost in South Vietnam.

A Self-Appraisal for Project Managers

by

Lt. Col. James Bain Jr., USA

Galileo said, "You can't teach a man anything; you can only help him find it in himself." An objective appraisal of your performance can help you find, in yourself, a better project manager.

Students from Government and industry at the Defense Weapon Systems Management Center (DWSMC) learn to be better program managers by objective evaluation of their deficiencies. Sincere requests for criticism from fellow students are usually rewarded by disturbingly frank comments. This leads to improvement. In this process, the instructor serves as a catalyst to accelerate the free exchange of constructive criticism.

It seems that most students are deficient in their balanced emphasis, rather than the development, of skills. Many students selected to attend DWSMC, a DOD-sponsored school for major weapon system program management, have already developed the skills required. In practice situations confronting a program manager, most students consistently and unconsciously over-emphasize certain skills and neglect others. A project manager who is qualified, but who neglects some skills, has the same impact on the organization as one who is unqualified. The important difference is that one with ability can easily improve by placing equal emphasis on neglected skills. Most students, however, are unaware of their neglect until class discussions help them realize it.

Practicing project managers may also be deficient in their balanced emphasis of skills, yet be totally unaware of it. Most program managers, and particularly those with higher education, feel they do a good—if not excellent—job of managing a project. Because people are so easily offended when criticized outside of an academic environment, other people hesitate to tell them what they really think of their managing efforts. This strengthens their illusions. Consequently, some program managers fail to improve with practice.

Improvement is possible, but it must begin with objective self-appraisal. A practicing project manager does not have advantage of "academic immunity." A student can "run the world" as often as necessary to learn from appraisal of his mistakes. A practitioner can only "run the world" once, and usually without the benefit of constructive criticism. This forces him to find it in himself to improve by objective self-appraisal.

The purpose of this article is to identify the neglected skills of student project managers to help practicing project managers evaluate their own performance.

The approach describes the skills that a good project manager emphasizes and a poor project manager neglects. The impact of each is compared, because an organization reflects a true image of the project manager's performance Finally, four action steps to become a better program manager are outlined.

Functions and Skills of a Good Project Manager.

A good project manager performs three separate, yet interrelated functions, namely, executive, management and leadership. The executive function determines objectives, policies and programs to produce a weapon system on time, within cost, and with the required reliability and performance. Management controls performance, schedule and cost to accomplish established programs. Leadership promotes essential contributions from individuals.

Executive Function and Skills. The executive function involves decision making to regulate the relations among desired objectives, available means of the organization, and limiting factors of the situation. Possible objectives desired by the decision maker are determined. Courses of action which have some chance of yielding desired objectives by employing available means are also determined. Each feasible course of action is then analyzed to determine its probable outcome in an anticipated, or estimated, situation. All factors which can affect the outcome, and which are not under the decision maker's control, should be considered. These steps may result in a decision not to decide.

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Emerging from this decision process may be an operating policy or program which must be complete and understandable before management can begin. A program specifies what objectives must be accomplished, in what period, and with what organizational means. Policy specifies the organization structure to carry out the programs and the limits of action by immediate subordinates. It is essential that policies and programs be related and compatible.

The executive function requires the skills of innovating objectives, policies and programs; anticipating all factors of the situation; and organizing means to be generated and allocated. More intuition than knowledge is involved because of conditions of uncertainty. Much of the expected value of decisions and their probable outcomes are only intuitively known by the decision maker. There is much that is not susceptible to either quantitative or qualitative statement. Students at DWSMC felt that the executive skills of the program manager approximate 80 percent intuition or arts; and 20 percent knowledge or science.

A good project manager jealously guards his prerogative to make decisions which must be interrelated, and which will affect the whole. He alone sees the whole and must decide pertinent policies and programs. Even his deputy is not permitted to make such decisions without express permission. He continually adjusts his policies and programs to prevent deterioration with the passage of time. He avoids abrupt adjustments based upon periodic reviews. He is careful not to decide questions others should decide. His policies and programs are primarily designed to answer important questions, which permits further refinement by lower levels. Most important, he considers the time lag between decision and action.

Management Function and Skills. The management function involves problem solving to control the relations among the work to be accomplished, the schedule of accomplishment, the cost resources and the budget. Management problems respond to measurement, calculation and standardized action. They are characterized by repetitive solutions and recurring situations. A problem exists whenever there is inequality among the elements of a simple management equation. Solving the problem requires changes in the work, cost, schedule, or budget to rebalance the management equation which is expressed as follows:

$$\frac{\text{Work}}{\text{Time Period}} = \frac{\text{Cost}}{\text{Time Period}} = \frac{\text{Budget}}{\text{Time Period}}$$

The management function requires skillful programming, costing and budgeting. More knowledge than intuition is involved because of conditions of certainty and risk. The expected values of work, cost and schedule can usually be determined, and the possible outcomes occur with known probabilities. The criteria of choice is maximization of expected value. Techniques and procedures describing the applications of these skills comprise the bulk of existing literature on project management. DWSMC students felt that the management skills approximate 80 percent knowledge or sciences; and 20 percent intuition or art.

Management problem solving is extensively delegated to organizational levels by means of an integrated programming-costing-budgeting-reporting system. Programming progressively divides and distributes responsibility for accomplishing program tasks. Costing attempts to express required resources in terms of a common denominator, the dollar. Budgeting progressively divides and distributes the authority to spend those dollars. Reporting continuously accumulates data on performance, cost, schedule and budget to assess the status and forecast the balance of the management equation. Each level has the responsibility for balancing its equation and solving problems within its authority. If a level cannot balance the management equation, the problem is an exception which must be reported to the next higher level.

A good project manager provides every protection possible to this management delegation process. He establishes and maintains a single system to insure delegation of commensurate responsibility, authority and information to solve problems. He attempts to solve only those exceptions referred to him by his immediate subordinates, but he continually monitors the delegation process by balancing his top level management equation. He establishes thresholds to provide a zone of authority to the lower levels, thereby reducing exceptions. He divides problem solving between his deputy and himself so he can concentrate on critical problems. Finally, he makes use of powerful quantitative techniques. Mathematical models are developed and refined to help determine effects of change and optimal solutions to complex problems.

Leadership Function and Skills. Leadership involves three conditions that must exist simultaneously before a subordinate can contribute. The individual must understand what to do, he must be capable of doing it, and he must be willing to do it. Leadership is a personal relationship between two individuals—the leader and the led. Inherent in each individual led is a different and changing set of conditions, i.e., understanding, willingness and capability. For this reason leadership is also a temporal relationship.

Leadership of individuals requires communicating to increase understanding, training to increase capability, and motivating to increase willingness. Leadership skills, like executive skills, are accomplished more by using intuition than knowledge. Empathy with individuals is the most valuable asset a leader can have, i.e., sensitivity to their response to him. DWSMC students felt that the leadership skills of the project manager approximate 80 percent intuition or art; and 20 percent knowledge or science.

Balanced Emphasis. Why do some project managers achieve satisfaction and accomplishment, while others fail? The answer lies in one magic, mysterious ability—balanced emphasis. Balanced emphasis on the equally important executive, management and leadership functions and skills is the secret of success.

Balanced emphasis results in the most effectiveness for the least effort by the project manager. Odd as it may seem, a good project manager needs only average ability in all necessary functions and skills, if he can balance them.

Functions and Skills of a Poor Project Manager.

A poor project manager overemphasizes management and neglects the equally important executive and leadership skills. He has lost his balance by seriously misjudging the relative importance of management, which is known and described by a wealth of literature. The executive and leadership functions cannot be so easily described and little literature exists. They are mostly intuitive in nature.

While the increasing complexity of project work demands better management techniques, it also necessitates better executive and leadership skills to support them. One should not judge the importance of skills by the pounds of literature produced. It's sheer folly to let this criterion be the reason for neglecting executive and leadership skills in practice.

Neglected Executive Skills. A poor project manager neglects the executive skills of innovating and anticipating. He reacts to the present situation and existing directives more than he anticipates future situations and innovates realistic objectives. His highest executive responsibility of creativity has reverted to nothing but responsiveness, when he reacts.

The cause of this neglect is primarily the elaborate channels of coordination and decision through which changes must be staffed for approval. The continuing growth of staff agencies in both size and number in modern organizations results in dispersal of authority which is exercised without responsibility. This seriously limits the project manager's flexibility to innovate and anticipate change. He is forced to justify changes by resorting to reasoning which appears rational and appeals to specialized staff agencies. This is an extraordinary feat of salesmanship which would stagger and crush the best of men considering the many different specializations and levels of those that must be persuaded.

Dilemmas which result from complex decision-making structures imply at least one of the following. First, a project manager can choose to react and accept the consequences of not innovating and anticipating. Second, a

IMPACT OF EXECUTIVE EMPHASIS UPON THE ORGANIZATION

POOR PROJECT MANAGER	GOOD PROJECT MANAGER
OBJECTIVES, POLICY & PLANS	
—Unrealistic and Deterministic	—Realistic and Dynamic
—People Know But Don't Believe and Can't Achieve	—People Know, Believe & Achieve
ORGANIZATION ORDER	
—Crisis, Panic and Crash Action	—Urgent, Expedited and Unified Action
—Work Done and Redone	—Work Done Once
—Deadlines Missed and Policy Violated	—Deadlines Met Within Policy
—Routine Actions Suspended	—Routine Action Continued
PERFORMANCE OF PEOPLE	
—Few Key People Involved Doing Work For Long Hours	—Few Key People Available for Guidance and Decisions
—Working Levels Keep Busy Doing What They Want	—Working Levels Kept Busy Doing What Is Necessary
—Responsibility Usurped by Crisis	—Responsibility Delegated Thru Channels
PERFORMANCE OF PROJECT MANAGER	
—Always Too Busy Fighting Fires	—Never Too Busy To Fight Fires
—Forced To Make Routine Decisions For Lack of Policy and Thresholds	—Uses Policy and Thresholds To Force Routine Decisions By Organization

Figure 1.

project manager can choose to innovate or anticipate, and accept the consequences of his initiative, i.e., persuading the specialized staff.

Some project managers choose to follow the first course because it is easier and avoids "making waves." They have not developed a talent for persuasion on the scale required. They prefer to accept the risk of not innovating or anticipating rather than the risk of failing to persuade higher levels. Included in this group are some project managers who have been worn down by frustration.

Other project managers follow the second course of action and accept the penalty for innovating or anticipating. They have a talent for persuasion but must spend considerable time and effort in its accomplishment. Persuasion results at best in delay and at worst in disapproval. They are willing to pay this price to insure that their objective, policies and programs are as realistic as possible under the circumstances.

The impact of neglecting executive skills is the same whether caused by the project manager or the conditions imposed upon him. Neglecting to anticipate and innovate results in setting unrealistic objectives, policies and programs. People can never believe in, nor achieve, unrealistic objectives.

Without realistic objectives, there is no unity of organized effort. People either do what they think they should, or do nothing. Without a unifying purpose, people naturally align their actions to satisfy their own interests and motives.

Figure 1 summarizes the impact of executive emphasis upon the organization.

Overemphasized Management Skills. A poor project manager overemphasizes his role in the management function by doing or approving problem solving delegated to subordinate levels. He does his subordinates' problem solving in the work he knows. He holds confirming reviews to approve his subordinates' solutions in the work he does not know. Again, his emphasis is upon skills requiring more knowledge than intuition.

This overemphasis is caused by the poor project manager being overinterested in work he knows, and overcautious about work he does not know. But when he gets to the problem solving of lower levels, he usurps the responsibility and authority which he has delegated.

Probably the most vivid description of what happens to the organization as a result of these two management failings is "the poor project manager is very busy moving around the furniture in his house while the house is on fire." He gets so busy, he lets his own management function go and he can never find the time to perform executive and leadership functions.

There is another sure indication of these failings. Two separate management information systems are created—one for the poor project manager himself and an "eyewash" system for his organization. Because the poor project manager attempts to solve and approve all problems himself, he necessarily needs a great deal of information. He usually obtains this information by an informal system of reporting and by extensive traveling to "get the facts."

Another serious impact upon the organization is indecisiveness and a diminution of a general sense of responsibility in his people. This stems from an apparent lack of confidence in their problem solving. Because of this lack of confidence, people redelegate their responsibility and authority back to the project manager.

Figure 2 summarizes the impact of the management emphasis upon the organization.

Neglected Leadership Skills. A poor project manager gets caught in the trap of attempting to manage rather than lead people. He fails to communicate and motivate. He becomes more authoritative than communicative, and he relies more on material incentives than moral persuasion.

Neglect of these skills in practice is caused by assuming people are not willing to contribute. This assumption leads him to blame people. He, then, attempts to use his authority by demanding their participation. Material incentives are used to regard those willing to conform and those who are unwilling are punished.

A poor project manager is unaware that his communication skills are to blame rather than his people. His people simply do not understand what he wants. He writes and talks, but seldom informs. He hears, but seldom listens. He sees, but seldom has time to read. He consistently under-estimates the intelligence and over-estimates the information of his people. They, in turn, consistently over-estimate his intelligence and under-estimate his information. He pays little attention to improving oral communications in the organization such as daily staff meetings, telephone contacts, conferences, briefings, etc.

His usual habit of blaming people severely limits his skill in moral persuasion. People do not believe his reform measures are important and they are not motivated to succeed. His negative attitudes are apparent to all. He is cynical, critical, impatient, and sees mostly the bad side of people. His attitudes reflect his feeling that his people will fail, and they do.

The impact of these neglected skills upon the organization is deliberate withholding of information. His failure to communicate and motivate results in frustration among his staff. Subconsciously, people will defend against frustration by withholding some of what they contribute, i.e., information. The project manager has no way of measuring the loss of an idea that could have been contributed; however, he senses that it is happen-

IMPACT OF MANAGEMENT EMPHASIS UPON THE ORGANIZATION

POOR PROJECT MANAGER	GOOD PROJECT MANAGER
MANAGEMENT PROBLEM SOLVING	
—Does Subordinate Problem Solving In Work He Knows	—Does His Own Problem Solving At Level For Which He is Responsible
—"Approves" Subordinates Problem Solutions In Work He Does Not Know	—Delegates Problem-Solving Responsibility Within His Organization
ORGANIZATION ORDER	
—Usurps Responsibility And Authority Delegated To Subordinates	—Maintains Delegated Responsibility And Authority of Subordinates
—Maintains Two Separate Management Information Systems—One Informal System For Himself—Another Eyewash System To Impress His Superiors	—Maintains A Single Integrated Management System For His Organization And He Uses It
—Continuous Slippages And Overruns	—Occasional Slippages And Overruns
PERFORMANCE OF PEOPLE	
—Reduction In Sense Of Responsibility	—Willing Acceptance Of Responsibility
—Indecisive And Frustrated	—Decisive and Satisfied
PERFORMANCE OF PROJECT MANAGER	
—Indispensable	—Key People Can Carry On
—Always Too Busy In Meetings	—Never Too Busy To Meet
—Over-Cautious In Work He Doesn't Know	—Confident Of People In Work He Doesn't Know
—Over-Interested In Work He Knows	—Patient With People In Work He Knows

Figure 2.

ing. He now brings his full-line authority to bear upon his organization. Threats, measurements and reform procedures are the order of the day. People retaliate by consciously withholding information. They develop an ability to avoid responsibility and, thereby, stay out of trouble. This vicious circle goes on until the project manager is isolated in an information vacuum.

Figure 3 summarizes the impact of the leadership emphasis upon the organization.

Become a Better Project Manager.

Here are four steps to balance your skills and become a better project manager. Try them. The benefits will convince you, far beyond these words, that neglect of these skills is robbing you of success and satisfaction as a project manager.

Achieve Balanced Emphasis. This means equal emphasis on the executive, management and leadership functions and skills. There is no "cookbook" which teaches balanced emphasis. The only real test of balance is the effects of emphasis upon the organization. For this reason, continually evaluate your balance by using Figures 1, 2, and 3. More than likely, you will find your management is overemphasized at the expense of the executive and leadership function. Consciously force yourself to spend equal time on each function until it becomes persistent habitual experience. Continue to evaluate the effects of your emphasis upon the organization until confident you have achieved balance.

Set Realistic Objectives, Programs and Policies. Improve executive skills by spending more time thinking of ideas and the future. Use your ideas to control the future, not just to forecast and describe it. Think far enough into the future to take into account the delays to obtain approval and implement the decision. Prepare a statement of objectives which are projected at least five years into the future. Specify how resource requirements for objectives will be generated and allocated. Prepare a compatible statement of operating policies which will answer the important questions to be asked. Identify who in the organization structure will recommend, decide and implement actions. Establish the control system that will be used in the organization. Get together with your immediate subordinates and let them participate in setting interrelated objectives and policy. Ask them to tell you how you can help insulate them from harassment from higher authority in accomplishing their objectives. Take action to overcome this interference.

Solve Your Own Management Problems. Improve your management by solving only those problems which are referred to you by your immediate subordinates. Do not usurp delegated responsibility and authority by solving and approving their problem solving. Let them solve their own problems and expect them to make some mistakes in doing it. Insist upon a problem analysis for all exceptions. Maintain a single integrated programming-costing-budgeting-reporting system, such as PERT/Cost, throughout your organization. Be sure you use it. Take the time to teach your people how to use the management equation. Improve their management capability by using some of the newer quantitative techniques, such as cost effectiveness modeling and statistical cost estimating.

Communicate and Motivate. Improve your leadership by communicating and motivating. Improve your reading and listening skills. Pay increasing attention to improving your oral communication. Use both mass communication and man-to-man techniques. Motivate people by positive attitudes. Get them to believe that what they are doing is important. Believe your people are good and tell them they are good. Take every opportunity to commend them for any job well done.

Summary.

Student project managers from the Government and industry unconsciously neglect some of their perfected skills. In general, students neglect their innovating, anticipating, communicating and motivating skills. Management problem solving is overemphasized at the expense of executive and leadership skills.

Students correct these deficiencies by self-appraisal. They become aware of their neglect in class discussions and improve by placing equal emphasis on neglected functions and skills.

You may also be unconsciously neglecting some of your skills. Self-appraisal, using Figures 1, 2, and 3, can make you aware of your neglect. You can easily improve by balancing your emphasis to be a better project manager.

IMPACT OF LEADERSHIP EMPHASIS UPON THE ORGANIZATION

POOR PROJECT MANAGER	GOOD PROJECT MANAGER
CONTRIBUTIONS FROM PEOPLE	
—Responsive Participation	—Responsible Participation
—Passive Resistance	—Active Cooperation
—Information Withheld	—Information Contributed
ORGANIZATION ORDER	
—More Procedures and Measurements	—More Policy & Encouragement
—High Price Paid for Contributions	—Low Price Paid For Contributions
PERFORMANCE OF PEOPLE	
—Uninformed, Frustrated, Defensive And Negative	—Informed, Satisfied, Cooperative And Positive
—Motives Aligned With Incentives	—Motives Aligned With Objectives
—Develops An Ability To Stay Out Of Trouble	—Willing To Accept More Responsibility
PERFORMANCE OF PROJECT MANAGER	
—Assumes People Are Unwilling	—Assumes People Misunderstand
—Blames His Subordinates	—Blames Himself
—Attempts To Demand	—Attempts to Improve
—More Authoritative	—More Communicative
—Relies More On Material Incentives tives	—Relies More On Moral Persuasion

Figure 3.

New Amphibious Assault Ship To Carry Helos

A new multi-purpose amphibious assault ship, designated the LHA, that will combine the use of both helicopters and landing craft in a single vessel is now being planned by the U.S. Navy.

The size and versatility of the new ship will increase the Navy's amphibious assault capability by permitting the transport of larger Marine Corps forces on a single ship.

Concept formulation and contract definition will be carried out by the Navy to obtain complete competitive design and construction proposals from industry.

Broad specifications and performance requirements will be provided to the contract bidders who will submit proposals on the complete design and characteristics of the ship. The contract will be awarded on the basis of the quality of the design, production and total life cycle costs.

A project management office, headed by Captain Frank J. Reh, USN, has been established in the Naval Ship Systems Command for the LHA project.

COIN

by

Capt. J. L. Coleman, USN

The acronym COIN has become the accepted name for an airplane designed expressly for the general field of counterinsurgency operations. The OV–10A (COIN) aircraft is being developed by the Navy as a tri-Service program to obtain a true counterinsurgency weapon system. In some circles it has been referred to as the "guerrilla warplane."

Work toward a COIN aircraft can be traced back to 1951 when a Navy design competition was held for an observation-liaison helicopter to combine the observation tasks of light airplanes with the rescue and utility tasks of helicopters.

Series of Developments.

The Navy contracted for the development of the OV–1 Grumman Mohawk in 1957 to fulfill Army and Marine Corps requirements. Financial considerations caused the Marines to abandon the OV–1, although the need for a weapon system to fill the void between the helicopter and the attack close air support bomber still existed. Later, the OV–1 was transformed into a sophisticated observation/surveillance vehicle for the Army.

In mid-1961 the Navy was asked to review the feasibility of developing an extremely small, light, simple and inexpensive airplane intended to operate in a battlefield environment at the battalion or regimental level. Called the L^{2}VMA for Light Marine Attack, it was to be immediately available for use by the ground commander in an armed attack role as well as for observation. The L^{2}VMA became the foundation from which the present counterinsurgency type aircraft concept emerged.

The concept of the COIN aircraft continued under study and in the fall of 1962, the Director, Defense Research and Engineering (DDR&E), added the limited transportation of personnel and cargo to the required missions. The use of this airplane, as seen by DDR&E at the time, was to replace a large inventory of obsolescent planes being used by the United States and throughout the world by the Military Assistance Program countries.

Navy Named Development Agency.

In mid-1963 military interest in the COIN concept became a reality with the Navy being assigned developmental responsibility and the establishment of a steering committee under the chairmanship of the Assistant Secretary of the Navy for Research and Development. The membership of the steering committee included the Assistant Secretaries for Research and Development of the three Services, representatives of DDR&E and the Advanced Research Project Agency (ARPA), and the Deputy Chief of Staff (Air), U. S. Marine Corps. A working level committee made up of alternates for each member provided day-to-day continuity. By virtue of the steering committee participation, the specifications developed by this group for the design competition, in effect, had tri-Service approval.

The Bureau of Naval Weapons (now Naval Air Systems Command), which was assigned development and contractual responsibility, issued preliminary specifications to industry for a LARA (Light Armed Reconnaissance Airplane) in December 1963.

Proposals were received in March 1964 from 11 firms. The Navy conducted its normal evaluation of these proposals and, after approval of the steering committee, awarded a contract to the North American Aviation Columbus, Ohio, Division to design, build and flight test seven prototype aircraft on a firm fixed price basis. The contract also contained options for the purchase of varying lots of aircraft up to a maximum of 500 on a fixed price ceiling arrangement.

Capt. Joseph L. Coleman, USN, has served as project manager for the Navy's COIN project since September 1964. Capt. Coleman is a designated Navy aviator and has a wide background of service in the Navy's air arm. He has attended the Armed Forces Staff College and the Naval War College.

Variety of Missions.

The OV–10A is designed to perform a variety of military missions, including observation and armed reconnaissance, forward air control of attack aircraft, helicopter escort, limited ground attack, target marking, gunfire spotting, liaison and utility. It could also be adapted, if desired, to perform such peacetime functions as security patrol, disaster relief, medical missions, riot control, aerial mapping and spraying.

The aircraft is to be capable of operating from rough unprepared fields, in addition to prepared airfields and aircraft carriers. Although floats are not procured for the seven prototype aircraft, amphibious float capability for operation on waterways can be provided in production aircraft.

A high degree of reliability, ruggedness, simplicity of operation and low cost was emphasized in the design of the aircraft combined with the requirements for weapons delivery, reconnaissance and light transport.

The North American concept features twin turbo-prop engines and twin booms with the horizontal tail mounted high between twin vertical tails. The fuselage is mounted under the wing and the pilot and observer are seated in tandem ahead of the propellers with virtually unobstructed visibility.

A 74-cubic-foot cargo compartment in the fuselage has a capacity for carrying either cargo or personnel. Access to the cargo bay is gained through a hinged door at the rear of the fuselage. This access permits waist-level loading of cargo or personnel. The rear seat and flight controls can be removed, thereby increasing the cargo capacity to 111 cubic feet.

The cargo compartment with the rear seat removed can accommodate more than 3,200 pounds of cargo, five paratroopers with full equipment, six combat-equipped infantrymen, or two litter patients with a medical attendant.

The high tail assembly design provides for direct transfer of cargo from trucks which can be backed up to the loading door, and also permits paradropping of cargo or paratroopers.

External stores can be carried on five store stations. Three stations are located on the fuselage; the remaining two stations are on removable sponsons mounted on the fuselage. The sponsons also contain four fixed 7.62 mm M60 machine guns.

For a typical attack mission, the OV–10A can be armed with up to 2,400 pounds of external stores, including assorted bombs, napalm and rocket clusters, and machine guns. Two wing-tip missile stations are also provided.

Guns and armor protection provide the aircraft with its close support and helicopter-escort missions capability.

Designed to "live with the troops," the OV–10A is equipped with large tires and an extremely rugged tricycle landing gear which will enable the aircraft to operate from unimproved fields in primitive areas. The aircraft can be converted for amphibious operations by substituting twin floats, containing built-in retractable wheels, in lieu of the tricycle landing gear.

Management Plan.

On July 20, 1965, the OV–10A Weapons System Project was established as a designated project within the then Bureau of Naval Weapons with the responsibility to develop and refine the system to meet the requirements of the three Services and the Military Assistance Program.

The management of the OV–10A is accomplished through a project team assigned within the Naval Air Systems Command structure. This team is headed by the designated project manager and is staffed with deputy project managers from the Marine Corps, Army and Air Force. The project manager is assisted by assistant project managers for technical, production, support and procurement areas within the Air Systems Command. These assistant project manager members establish liaison with the parallel structure within the Air Systems Command divisions, and at parallel levels with the contractor management team. They report in the vertical structure to their division head and the project manager. Changes affecting detail specificaton or cost are processed by the team through their cognizant areas and presented to the Intra-Bureau Change Committee for approval.

The management plan for the OV–10A includes the Navy PROMPT (Program Reporting, Organization and Management Planning Technique) management tool and is used by North American Aviation as provided for in the basic contract. PROMPT provides uniform information reporting procedure and methods for systematically and periodically comparing actual performance against approved plans and schedules. The PROMPT reports are prepared in a prescribed format for insertion into a Program Profile Manual, thereby providing the current status for the project manager and contributing to the overall continuity and management of the weapon system. Once the program profile manual is established, the general policy of PROMPT is "reporting by exception."

A companion system for use by all elements of the Air Systems Command is the Project Master Plan which provides the basis for the control, direction, coordination and evaluation of a project throughout all phases of a project life cycle. The program profile manual provided by the PROMPT system contributes to the make-up of the project master plan and is supplemented by the project team and other divisions of the Air Systems Command.

The principle management technique employed is Time Base Schedule consisting of milestones in all areas of accomplishment.

Present Status.

On July 7, 1965, an advanced test vehicle OV–10A aircraft was rolled out at North American Aviation's Columbus Division three months ahead of schedule. Five prototype aircraft are now flying. Three of these aircraft were used for the Navy Preliminary Evaluation completed in March 1966 by Service pilots. Upon completion of additional contractor demonstrations and development testing, a final Navy Preliminary Evaluation will be held. Subsequently, the aircraft will be subjected to trials by

(Continued on Page 17)

The multi-purpose OV–10A Aircraft (COIN) is equipped with high lift devices making it capable of operating from small unimproved fields.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Maj. Gen. Abe J. Beck, USAF, has been assigned to duty as senior Air Force Member, Military Studies and Liaison Div., Weapon Systems Evaluation Group, Office of the Dir., Defense Research & Engineering.

Maj. Gen. Dwight O. Monteith, USAF, has been designated as Project Manager for Project Cloud Gap.

RAdm. James A. Dare, USN, has been appointed Dep. Dir. for Operations & Administration, Defense Atomic Support Agency, replacing **Brig. Gen. Kenneth F. Dawalt**, USA, who has been reassigned as Dep. Chief of Research & Development for International Programs, U.S. Army. Adm. Dare was Commander, Naval Ordnance Laboratory, White Oak, Md. before being assigned to DASA.

Brig. Gen. Thomas S. Jeffrey Jr., USAF, has been assigned as Staff Director for Aircraft, Office of Asst. Secretary of Defense (Installations & Logistics).

Paul C. Warnke, formerly a partner in the Washington law firm of Covington and Burling, has been sworn in as General Counsel for the Defense Department.

Capt. J. N. Horrocks, Jr., USN, has been assigned as Special Asst. to the Dep. Asst. Secretary of Defense (Public Affairs), replacing **Capt. Lloyd Young**, USN.

The new Dep. Dir., (Scientific), Defense Atomic Support Agency is **Dr. N. Frederick Wikner**. He succeeded **Dr. Theodore B. Taylor**, who has held the position since October 1964.

Col. Amos A. Jordan, USA, has been designated Dir., Near East, South Asia and Africa Region, Office of Asst. Secretary of Defense (International Security Affairs).

Capt. Francis B. Grubb, USN, has been appointed Comptroller and Dir. of Programs for the Military Traffic Management & Terminal Service.

Col. William D. Kyle Jr., USAF, has been reassigned as Commander, Subsistence Regional Headquarters, Chicago, Ill., Defense Supply Agency.

DEPARTMENT OF THE ARMY

Col. Eduardo M. Soler has been named Project Manager of the newly established utility tactical aircraft system at the Army Aviation Materiel Command, St. Louis, Mo.

Col. Ivey O. Drewry Jr., Project Manager for the Army's Nike-X missile defense project at Redstone Arsenal, Ala., has been promoted to the rank of brigadier general.

Kenneth M. Barnett, who had a major role in organizing the nationwide tornado forecasting service operated by the U.S. Weather Bureau, has been appointed as Dep. Dir., of the Army Electronics Command's Atmospheric Sciences Laboratory.

The new acting chief of the Small Business Office of the Army Mobility Equipment Command, St. Louis, Mo., is **Valda N. Cordell**. Mr. Cordell replaces **Ben Kaylor**, who has retired from Federal service.

Robert C. Trick, formerly with the Air Force Systems Command, has been named Value Engineering Coordinator for the Army's Strategic Communications Command in Washington, D.C.

Henry C. C. Weinkauff is retiring from his position as Chief, Planning Div., Civil Works, Office of the Army Chief of Engineers, Washington, D.C.

The following assignments have been made at the U. S. Army Laboratories, Natick, Mass.: **Col. James G. Bennett** as Chief, Airdrop Equipment Div.; and **Col. William B. Levin** as Chief, Technical Plans Office.

DEPARTMENT OF THE NAVY

VAdm. Thomas F. Connolly has been assigned as Dep. Chief of Naval Operations (Air) from duty as Commander, Naval Air Force, Pacific.

RAdm. Robert L. Townsend became Commander, Naval Air Systems Command, relieving **RAdm. Allen M. Shinn**. Adm. Shinn has been ordered to duty as Commander, Naval Air Forces, Pacific, with the rank of vice admiral.

Capt. Sam E. Edelstein Jr., has assumed duties as Dir., Naval Electronics Systems Command, Western Div., at San Francisco Bay Navy Shipyard.

Capt. Roger G. Ireland, MC, became the Dir., Aerospace Crew Equipment Laboratory, Naval Air Engineering Center, Philadelphia, Pa., Sept. 1. He succeeds **Capt. Henry G. Wagner** who has retired from the Navy.

Capt. D. R. McComish has assumed command of the Naval Supply Depot at U.S. Fleet Activities, Yokosuka, Japan. Capt. McComish relieved **Capt. E. R. Joshua Jr.**, who has been reassigned to duty with the Naval Supply System Command headquarters in Washington, D.C.

Capt. William M. Nicholson has been assigned as Dir., Deep Submergence Systems Project Office, in Washington, D.C.

Cdr. Frank W. Smith Jr., SC, is the new Officer-in-Charge of the Navy Production Equipment Control Office, Naval Air Engineering Command, Philadelphia, Pa.

DEPARTMENT OF THE AIR FORCE

Gen. James Ferguson, Commander, Air Force Systems Command, has been assigned additional duty as Dir., Manned Orbiting Laboratory (MOL) Program.

Maj. Gen. Frederic H. Miller, Commander of the Middletown Air Materiel Area, Olmsted AFB, Pa., since 1962, has retired from the Air Force after more than 30 years service. On Oct. 3, Gen. Miller began a new career with the National Aeronautics and Space Administration as Dep. Dir. of Administration and Chief of the Resources Management Office at Cape Kennedy, Fla.

Dr. Robert H. Cannon Jr., Professor of Aeronautics and Astronautics at Stanford University has been named to succeed **Dr. Robert G. Loewy** as Chief Scientist of the Air Force.

Col. Gerrit D. Fremouw has been reassigned from duty with the Strategic Air Command to Vietnam where he will serve as Chief Engineer, Base Development Div., MACV, Saigon.

New assignments in the Air Force Systems Command (AFSC) are:

Col. Ross L. Blachly, Dep. for Test Operations, Air Proving Ground Center; **Col. William G. King**, Commander, Air Force Satellite Control Facility, Space Systems Div.; **Col. Roger H. Terzian**, Dir., Research & Development Procurement, Systems Engineering Group, Research & Technology Div.; **Col. Paul H. Kenney**, Dir., AFSC Resources Planning, Hq., AFSC; **Col. James R. Pugh Jr.**, Dep. Dir. for Procurement, Aeronautical Systems Div.; **Col. Arthur D. Thomas**, Asst. Dep. for Reconnaissance, Aeronautical Systems Div.; **Col. Roy D. Ragsdale**, Dep. for Command Systems, Electronic Systems Div.; **Col. Raymond A. Gilbert**, Vice Commander, Research & Technology Div.; **Col. James H. Webb**, Dir., Gemini Support, Hq., AFSC; **Col. Robert P. Daly**, System Program Dir. of newly formed F-X Advanced Tactical Fighter System Program Office; **Col. Otis R. Hill**, Dir. of Aerospace Instrumentation, Electronic Systems Div.; **Col. Edwin V. Brown**, Vice Commander, Arnold Engineering Development Center; **Col. James O. Cobb**, Dep. for Engineering and Technology, Ballistic Systems Div.; **Col. Reynold A. Soukup**, Dep. for Technical Support, Air Proving Ground Center; and **Col. C. B. Werner**, Acting Dep. for Test and Engineering, Air Force Special Weapons Center.

New assignments in the Air Force Logistics Command are:

Col. Buddy R. Daughtrey, nominated for promotion to brigadier general, Dep. Commander, Ogden Air Materiel Area, and **Col. James T. Bull**, Dir. of Information, Ogden Air Material Area.

An Overview of Air Force Procurement

by
Lt. Col. Jacob B. Pompan, USAF

In the past several years a wide range of policies, procedures and techniques has been introduced into the Government contracting arena. Each of these innovations was designed in some respect to help achieve a better contract and to obtain a product or a service more efficiently.

Figure 1 portrays a few of these innovations.

While each of these innovations—in its own right—may well be a step forward in Government contracting, we can't make the mistake of looking at any one of them "in its own right." We must look at them in some more meaningful fashion because, if we assume that they were not developed in some random fashion, then I think it follows that there is a meaningful relationship.

In Figure 2 innovations have been placed in a more precise—a more meaningful—relationship. This article will discuss what that relationship is and how it was developed. Understanding that relationship is the first step in understanding and evaluating the changes taking place today in Defense contracting.

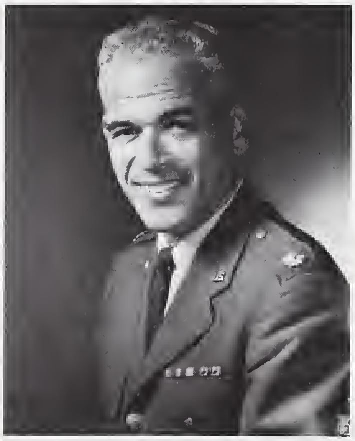
The purpose of this article then is to:

- Explain what the objective of the Air Force is in the Government contracting field.
- Describe how the major procurement policies support that objective.
- Describe how some of the tools or innovations, which have been designed to make these policies work, actually help achieve the objective.

I hope to show a definable connection between the Air Force procurement objective and the policies and procedures which we are faced with using each day. If we can discuss what we are putting out in the policy business in terms of the objective, then we will be a whole lot closer to the proper implementation of these policies and procedures.

One of the basic contract objectives of today's procurement effort in the contract area is achieving COST REDUCTION THROUGH THE PROFIT MOTIVE. Our cost reduction efforts with the contractor are based upon the premise that, first, the contractor is attempting to maximize his profit—both in the manner in which he manages the contracts which he has and in strengthening his position to obtain additional Government contracts. Secondly, while he is maximizing his profit, he is also decreasing the overall cost of that contract to the Government.

Now whether we achieve this objective or not in any single contract depends to a very large extent—if not totally—upon the pricing arrangement of the contract. If we have a firm fixed price (FFP) contract resulting from real price competition, the contractor has the highest cost risk and, consequently, there really should be cost reduction. If we have a sole source cost plus fixed fee (CPFF) arrangement with its minimal cost risk on the part of the contractor, the cost reduction motivation from the profit motive is likely to be weak. Between competitive FFP and CPFF, the spectrum has an infinite number of contract pricing arrangements, each of which may have a different impact on the contractor's risk and his cost reduction motivation. Therefore, it seems to follow that our objective, COST REDUCTION THROUGH THE PROFIT MOTIVE, is directly connected and, in fact, dependent upon our pricing arrangement—our pricing policy.



Lt. Col. Jacob B. Pompan, USAF, is a student at the Air War College, Maxwell AFB, Ala. Before entering AWC he was assigned in the Directorate of Procurement Policy in Headquarters, USAF and was the Air Force policy member of the Armed Services Procurement Regulation Committee.

Now, what is this pricing policy? The pricing policy says simply that we should buy through price competition. The Air Force wants to award in a firm fixed price-competitive market. When we buy in that manner, the contractor has the burden of determining the most economic allocation of his resources. Of course, we also avoid the requirement for cost or pricing data, and costly administration and audit.

But uppermost in our minds as the greatest advantage of a FFP award through price competition is that we have placed upon the contractor the maximum cost risk. If there is real competition to insure that his price had to be truly competitive, we can assume that the contractor's contract cost risk really is significant and that he will strive for maximum efficiency in his operations because of that risk.

Thus far, the pricing policy is straightforward. We award on the basis of the lowest sound price—on the basis of price competition. Here the pressures and constraints of the competitive market place are being relied upon to force the price down to a reasonable figure—and force the contractor to operate efficiently.

But, as we know, a significant amount of the dollars spent by the Air Force is not spent through price competition. In FY 1965, 74.8 percent of the Air Force's total obligations were not price competitive. The inability to buy through price competition can be traced to several causes. It could be that we do not have a sufficiently well defined specification of our requirement. It could be that there are insufficient sellers to create a price-competitive market, or that time just doesn't permit competition. It is also possible that there is a follow-on procurement in which competition of any kind, much less price competition, would be unrealistic.

Now in these and similar situations where there is no price competition, how does the pricing policy operate? Here we still try to place upon the contractor the maximum degree of contract cost risk. In fact, we try to motivate him to seek such risks. In other words, even though the contract may have been awarded on a non-price competitive basis, we still try to design the contract in such a way that the contractor will be motivated to be efficient. We want him to act as nearly as possible as he would in a price-competitive climate.

In review, we want adequate price competition to the maximum degree in our procurement because that type of procurement places the maximum cost risk on the contractor and will result in the lowest cost to the Government. However, when we cannot get price competition, we design into the contract some type of motivation which will induce the contractor to be efficient and to function as he would in a price competitive-high-risk situation.

In this non-price competitive situation we are relying upon two basic supporting policies: the profit policy and the incentive policy.

Looking first at the profit policy, we know that the Armed Services Procurement Regulation (ASPR) 3–808.1 says that we should use "profit to stimulate efficient contract performance." The policy states that low profit, the use of historical averages, and the application of a predetermined percentage are detrimental to achieving this motivation. The pricing policy, therefore, stands for the proposition that, when a contract is not awarded through price competition, the profit policy is one way to gain for the Government some of the advantages that are normally a part of the price-competitive climate. A contractor who accepts the cost risk and performs well will be rewarded with increased profit—and, if he fails to perform, his profit is reduced. Our pricing policy, our pricing arrangements, and a good number of our innovations are intimately tied into this philosophy.

It is all well and good to talk about objectives and policies, and to theorize about the economics of the model. These are the things of which speeches are made. However, it is quite another thing to provide the buyer with something concrete which can be used in the day-to-day procurement task—something which will make these policies meaningful and the objective attainable. We have this in the innovations in Figure 1.

The first step is to put these procedures—these tools—in a more understandable framework. Though we may have a whole host of tools in our kit box, they can be placed into a few logical groupings. Figure 2 portrays three rational groups. Group 1 is called an incentive group. The five innovations listed in that group are tools with which a buyer can seek to motivate a contractor to use his resources more efficiently. In one way or another, each of them—Weighted Guidelines, Incentive Contracting and Value Engineering—provides the contractor, through the incentive policy or the profit policy, and as part of the overall pricing policy, with an avenue to increase his profits while at the same time decreasing the Government's overall contract costs.

The second grouping is called the customer satisfaction group. It's relationship with the objective is perhaps less obvious than the incentive group, but it is no less important. Customer satisfaction is another way of saying

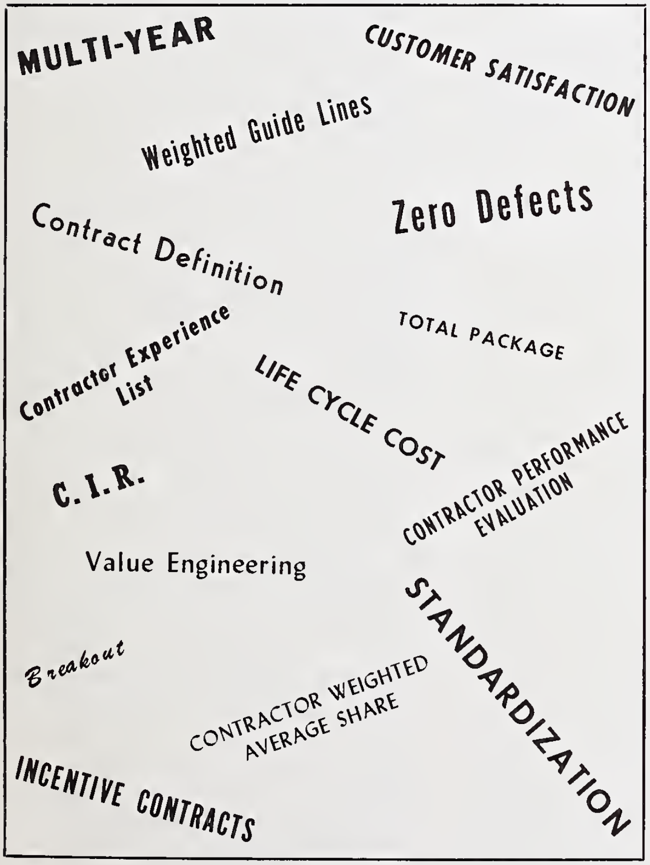


Figure 1.

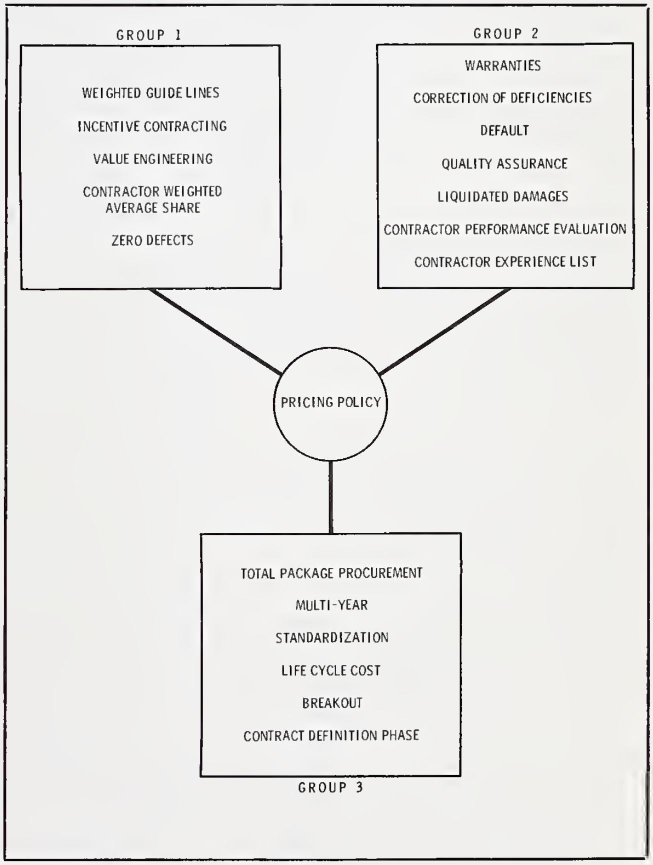


Figure 2.

that every reasonable step must be taken to insure that we ask for what we want—and get what we pay for. We are not getting what we pay for if it is delivered late or, if upon delivery, it is not reliable and does not function properly. We are not getting what we pay for or need if we must terminate for default and re-procure. The increased Air Force use of the correction of deficiencies clause and liquidated damages reflects a growing awareness of their value when used selectively. Default is an incentive—though perhaps a negative one. And the motivation of the contractor to look good in the contractor performance evaluation system and to stay far away from the Air Force and the Navy Contractor Experience Lists should be obvious.

At present there is no name for the third grouping—perhaps because it stands for a lot of different things to different people. Therefore, decide for yourself what you see in it.

However, these techniques could represent the eternal search in procurement for that fine balance between insuring the maximum possible competition and the lowest price for an item, while at the same time considering logistic support costs, and many other procurement and operational requirements. Multi-Year, Standardization, Life Cycle Cost, the Total Package Plan, Advance Procurement Planning, Breakout, and Contract Definition Phase—each is related to our objective. Some clearly are related to a greater extent than others. Each in some way motivates a contractor to reduce his costs in order to increase his profits or they give him the opportunity to increase his profits, and the reduction of costs necessarily result.

This can be made apparent by analyzing one tool from each of these groups to demonstrate that there really is a rational relationship between them and the objective of the Air Force.

We shall look first at weighted guidelines (Group 1). We are going to look at only two factors in weighted guidelines: the factor for contractor cost risk and the factor for contractor performance.

Cost risk has a profit range of from zero to seven percent depending upon three elements: type of contract, difficulty of the task, and the responsibility assumed through the type of contract. We are all aware of the extensive effort on the part of the Air Force to move away from CPFF contracting into FFP type contracts. The theory behind this effort is that, as a contractor moves towards FFP type contracting, he assumes more of the risk and, as he assumes more of the cost risk, he becomes more concerned with the expenditures of resources. He also has an opportunity for increased profits. Therefore, anything we can do to encourage him to move towards higher risk contracting—where theoretically he will be more concerned with how he spends his resources—and towards a type of contracting which will give him an opportunity to increase his profits—anything like that—is right in line with our objective of COST REDUCTION THROUGH THE PROFIT MOTIVE. If that is a reasonable conclusion, then weighted guidelines is an excellent tool to achieve that objective.

In contract cost risk the buyer, in effect, is telling the contractor that the Government will increase its negotiation profit objective under weighted guidelines if the contractor will move up the contract risk spectrum. The higher profits are worth it to us because, as he moves into higher risk contracting, the Government should achieve cost reduction due to the contractor's increased concern for how he spends his resources—or more to the point: COST REDUCTION THROUGH THE PROFIT MOTIVE.

Performance is the second factor in weighted guidelines. We know that in some contracts, such as CPFF, there is minimal cost risk to the contractor. If our theory of motivation depended solely on cost risk, we would be out of luck in a CPFF contract environment. However, motivation depends upon more than cost risk. Even in the CPFF environment, we tell the contractor that he is being watched. We are watching the way he manages his and our resources, the way he delivers, the quality of his product, and the degree to which he implements small business and labor surplus goals. We hope that this watchfulness on our part, and the contractor's knowledge that what we learn, will have a bearing upon future source selections and profit rates, will have a noticeable impact upon how the contractor operates under the present contract. We think that this factor in weighted guidelines has a very direct connection with the objective because the contractor—in theory at least—should try in any type of contract—and even in a CPFF environment—to be efficient, to allocate his resources intelligently, and to search for cost reduction. For he knows that his profits on future contracts, or even the award of those contracts, could well be in the balance.

Under Group 2 we shall discuss the correction of deficiencies clause.

How do warranties in general—and correction of deficiencies clauses in particular—relate to the Air Force objective? The Air Force has a formal correction of deficiencies policy. In its simplest form, it requires a contractor to perform precisely as he has contracted. If the product fails to perform, he must correct the deficiency. It is receiving wide application in the Air Force.

The contractor, who is faced with compliance with the correction of deficiency—or any sound warranty for that matter—and also faced with pricing constraints, has a distinct motivation which we feel is consistent with the objective. He does not want to be burdened with the costs of repair and replacement of defective material; he does not want to be pinpointed as a manufacturer of low quality material. In a price-competitive situation, he does not want to price himself out of an award by including unreasonable contingencies for this warranty. As a consequence of these considerations, we think that he will become more aware of his responsibility to provide us with precisely the product which we ordered and that he will exert more attention to the quality of his product. Finally, we feel that with these provisions the Air Force will get a better product—and this is cost reduction. When we get a product that breaks down in the field—even if it is replaced at no cost—that is not customer satisfaction. Getting paid for that breakdown is not what we are in business for. We want a product that will perform rather than just a contractor who will pay the bill for the product failure. A broader, but intelligent, use of warranties and correction of deficiencies clauses will bring home to contractors an awareness of our interest in this performance; an awareness that his profits and the award of subsequent contracts will be affected by that performance. Hopefully, within the Air Force, it will reduce the sometimes measurable—but often immeasurable—costs that accompany materiel failure. Again: COST REDUCTION THROUGH THE PROFIT MOTIVE.

Now, let us turn to the last grouping. The innovations here are of immense importance today in procurement and the systems acquisition business. Any one of them deserves considerable space for discussion. However, the purpose of this article is only to show the tie-in to the objective. With that in mind, let's look at the latest of these: total package procurement concept. This type of procurement envisions the procurement in a single competition of the engineering development and production of a system with as much support, such as aerospace ground equipment, spares, training equipment and contractor technical support, as is practicable.

Total package seeks to avoid the dilemma caused in the past when a contractor, building only the development portion of a program, had a tendency to quote rather conservatively. He could afford to do so since the development contract amounted to a relatively small percentage of the total program. His main incentive at that juncture was to secure the contract. His overall risk was rather small, however, since his work in the development portion of the contract almost invariably established him as a sole source in the event of follow-on production. Total package procurement deals not only with the development, or the top of the iceberg as it has been called, but rather the entire program. The contractor signs a contract that includes firm prices, or a firm pricing arrangement, not only for the development but for the follow-on production right through aerospace ground equipment and support as well.

There could be many important results of this approach:

- The contractor having won, in a competitive environment, work that involves the total system will be motivated from the outset to design the product with maximum efficiency. It is unlikely that he will have many value engineering change proposals in the production portion of the contract for his financial reward in production will grow from a maximum effort during the development engineering. He will begin his value engineering at the start of development engineering.
- His cost risk is very large. He can't "buy in" with impunity, for his contract which results from competition is not merely for the development but for production as well. It is safe to say that, through this unique application of incentive contracting, the Air Force has developed a technique which magnifies not only the opportunity but earned profit on the part of the contractor, and through that opportunity, significant cost reduction.

This article attempts only to sharpen the perspective of what's happening around us in Government contracting.

Several of the techniques which buyers are faced with in everyday operations have been mentioned. However, even though only a few of them have been discussed, this relationship that I attempt to draw between the objective and the policies, and the techniques or tools, exists to some degree in every single instance—strong in some, tenuous or perhaps even disturbing in others—but, nevertheless, it is a relationship to be reckoned with.

There is one point that should be stressed. It is important to recognize a difference between the objective, the policies that support the objective, and the tools that we hope will make the policies work. The objective was set at the highest level. It is fundamental to scores of Air Force policies and actions. Changing it is extremely unlikely. The pricing policy and the supporting policies of profit and incentives are also firmly established at the highest levels within the Air Force. To some degree they are spelled out in various places in the ASPR. In some respects they merely reflect economic facts of life. They would also be difficult to tamper with.

Finally, let's look at the tools or innovations which we use to carry out the policies. These are the easiest to design and to change. Many are not yet even implemented in the ASPR. It's with these tools that the contracting officer can have the greatest influence in designing the contract. In fact he has a responsibility to evaluate these to see if they work, and recommend changes if they don't help him to implement the stated policies and achieve the objective.

In other words, don't criticize any of these innovations because you doubt the validity of the objective, or the profit or incentive policy. Rather, criticize the innovations if in your opinion they fail to help us achieve the objective.

In summary:

- There is a fundamental Air Force objective towards which all our contractual pricing efforts should be directed; that is COST REDUCTION THROUGH THE PROFIT MOTIVE.
- This objective is supported by the pricing, profit and incentive policies.
- This entire complex of the objective—the pricing policy—and the two policies of profit and incentives are, in turn, supported by a multitude of techniques. Some techniques are very valuable and firmly established in our procedures. Some are rather transitory. All impact in some way on our daily efforts to achieve the objective.
- When the contracting officer doesn't like what's going on in the Government contracting field, he has a hunting license in this area of procedures.
- We should very critically evaluate and question each innovation against the standard of what it does, or fails to do, to help us achieve our stated objective: COST REDUCTION THROUGH THE PROFIT MOTIVE.

I would like to leave you with one last word of reassurance. These large numbers of new procedures are without doubt an important part of the way we do business today. But we should all remember that they are merely a means to an end. We cannot become so enamoured with the sophisticated new techniques that we lose sight of the real reason that we resort to them, i.e., to make sure that the product or service we need comes out the end of the line at the right time, at the right place, and in a quantity and quality to satisfy our requirement. That thought is uppermost in the minds of the people that write the policies.

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(Continued on Page 41)

The Specification Approach and SAIMS

by

Col. Herbert Waldman, USAF

The direction of effort to improve the performance measurement of large Defense weapon system projects and contracts was described generally in an article on the Selected Acquisitions Information and Management System (SAIMS) in the July 1966 issue of the *Defense Industry Bulletin* ("The Development of SAIMS"," p. 20). The current phase of that effort, in which the constructive collaboration of Government and industry is continuing, is the development of a DOD Schedule and Cost Planning and Control System Specification (SCPCS) for use with large negotiated contracts which are part of major high-cost and long-term programs.

We are seeking constructive comments from the industrial community to assist in developing a meaningful and workable product which may be used as a contractual requirement. In that effort the Office of the Secretary of Defense (OSD) has distributed a draft specification dated May 5, 1966, to the Council of Defense and Space Industries Association and to presidents of 60 large corporations. The development of the specification is also being coordinated with other Government agencies which share a common interest in using such techniques.

The objective of the specification approach is to outline the basic criteria that a contractor's planning and control system should meet. Among these are capabilities for providing specified kinds of data which effective planning and control systems would normally be expected to generate. Past studies conducted by DOD have consistently revealed existing deficiencies, e.g., the fact that contractor's systems for internal control were often found to be different from those used by the contractor to respond to the Government's reporting requirements.

Because DOD data requirements have often been out of phase, in both time and substance, with what was being generated in a contractor's internal management system, Defense managers have been inhibited in using contractor data in the form provided for prediction and decision making on relevant contracts and programs. Too often in the past, additional, sometimes duplicative, data requirements were generated for use in validating and adjusting originally furnished data which should have been sufficient to accomplish the intended purpose.

So long as the Government remains the contractor's cost-sharing partner, we will have an intense interest in a contractor's capability for producing results as planned and the timely delivery of specified products meeting clearly identified performance criteria. Defense interest in the management of cost in negotiated type contracts will also be stimulated by cost uncertainties which are indicated when contracts are negotiated with price ceilings as much as 30 percent over target costs.

In view of such Government interest, our current effort seeks to assure that a single internal control system will be used by our larger contractors which meets their needs as well as our own. This would eliminate the need to create separate and duplicate systems in any one plant as we have seen in the past. It has been expensive to develop many diversified systems resulting in the waste of thousands of dollars which could have been better applied to the development and production of hardware.

Col. Herbert Waldman, USAF, is Dir. for Assets Management Systems in the Office of the Asst. Secretary of Defense (Comptroller). He is a graduate of the University of Michigan and holds a master's degree in international affairs from George Washington University.

An early implementation of the DOD specification will result in better understanding of most DOD data requirements. It will greatly ease the contractors' current problems of preparing special reports which are responsive to the different criteria requested by various agencies within DOD. Implementing guidance for use by DOD components, in a form not yet determined, will also be developed with the specification approach.

The specification approach is nothing new in management. What is new is the development of a specific requirement for a contractor to:

- Plan work in significant work packages.
- Operate budget systems which are compatible with his plan.
- Accumulate, retrieve and provide current status information on a timely basis.

These points essentially promote the integration of existing data with quality improved by using some sharpened-up management tools.

There are five fundamental features in this approach:

- The contractor accommodates the requirements of the specification within his own organizational structure and determines how the items of work are related to contract objectives.
- Both the DOD procurement agency's and a contractor's schedule and cost data requirements will be derived from the same management system.
- Cost and schedule accomplishment will be identified at a level of responsibility described in terms of the contractor's management organization (work packages).
- Once DOD approves a contractor's implementation of the specification, a reduction in reporting requirements, as compared to existing practices, should occur. (The Government should utilize summary reports knowing that detailed information in a contractor's internal system will

(Continued on Page 24)

Educational Technology

by

Dr. Eugene T. Ferraro

Nearly all Defense Department activity, except actual warfare, is, for practical purposes, a form of education and training for that eventuality. Therefore, improved and superior educational processes have a significant bearing on all that we do. This is particularly true in the Air Force where we have such a high proportion of technical skill requirements as opposed to total requirements. The Air Force has been a leader in meeting this educational challenge.

What is the military—more particularly the Air Force—planning, proposing, hoping to do in the field of education?

Are we qualified to make recommendations, decisions, etc.?

Is the military viewpoint and its philosophy of educational development in the best interest of the nation's overall cultural objectives?

Recognizing that education in DOD is one of the nation's major activities, we have a responsibility to do it well, to assure that it shall not waste our resources—material and human—and that it is designed to attain our national goals — cultural and spiritual as well as military.

On June 14 and 15, after months of study planning, DOD officials presented this assessment of Defense manning to some 700 representatives of industry, education and Government. This was at a conference sponsored jointly by the National Security Industrial Association, the Defense Department, the Office of Education and the Department of Labor.

Defense spokesmen explained the massive task to be done and the programs already undertaken to improve the doing of it. They asked industry, with the help of all necessary supporting resources, to focus on this complex and difficult problem. They pointed out that, while much new technology could be made to serve, the ability to apply systems analysis and systems management techniques would most likely be key factors in a successful attack.

This has special significance to the Air Force. We have faced a number of massive, complex and difficult problems and have developed a systems approach which has served well in deriving solutions. A number of our major aerospace contractors have perfected the study and analysis techniques. Together, we have learned how to grasp the overall nature of worldwide and universe-wide problems. We have developed the "total" view which identifies and inventories all the subsystems and elements involved and finds the significant interrelationships of these parts. Finally, we have perfected a mathematical formulation technique which often allows measurement, priority establishment and some reasonable predictability.

The time has come to bring to bear the force of this analysis and solution technique to education and training. This area has earned a priority for such attention from our best analysts, economists and administrators.

The sheer magnitude of our Air Force structure requires tremendous systems study, organization planning and implementation capability. It has stimulated our concern with systems techniques and made the Air Force the nation's leading exponent; however, we realize we must go still further to retain the kind of superiority we now have.

Dr. Eugene T. Ferraro, Dep. Under Secretary of the Air Force (Manpower), is responsible for the management of manpower, personnel and Reserve Force resources. He is a graduate of Rutgers University and has M.A. and Ph.D. degrees from the Graduate Faculty of the New School for Social Research in New York. He has more than 30 years' experience in industrial management, the promotion of industry-Government relations and education.

Secretary of the Air Force Harold Brown, in response to the question, "What one thing would you like most to achieve in the next few years?" stated: "An analytical capability for the Air Force to equal its drive, excellence in management, and its great spirit. I want to help organize the talents which already exist within the Air Force to still further improve its materiel, training, and combat capability, so that it can play its part for the best interests of the United States and the Free World."

As a recent acquisition from industry with some involvement in complex tasks for the Military Services, I visualize the Air Force need for education and training as flowing first from an overall manpower analysis based on authorized force levels. Efforts are being conducted separately to improve our capabilities for this.

Second, we have a need to improve a personnel management system, under which our "inventory" of manpower resources—officers, airmen, civilians and contracted services—are surveyed continuously. This system must provide for the inflow of new personnel and the outflow of separations projected and for recognition of promotion potential and subsequent upgrading, Historical data will enable us to make quantitative estimates from which we can derive probable education and training requirements on which to plan our efforts.

Assuming we have a sound total requirements picture before us, I believe we could address ourselves to the educational and training "subsystem" and view it as a total enterprise. We would need to select three segments for a start:

- What should we be teaching:
- How should we do it?
- Are we getting results?

In more elegant terms, this would be curriculum, instructional technology and testing. This whole package would, in effect, comprise an educational technology.

We are devoting elaborate efforts to analyzing the educational and training needs of various assignments and jobs. We may be doing an excellent job; however, we may be able to get a better means of verifying the effectiveness of our programs by a

(Contnued on Page 38)

Air Force Tests Propulsive Wing V/STOL Model

The ADAM II propulsive wing, a revolutionary new aircraft with engines located inside the wings, is being evaluated by the U. S. Air Force at its Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio.

A full-span, powered model will be designed, built and tested by Ling-Temco-Vought, Inc., Dallas, Tex., under a $439,000 contract jointly funded by the Flight Dynamics Laboratory and the U. S. Army Aviation Materials Laboratory, Fort Eustis, Va.

ADAM, an acronym for Air Deflection and Modulation, features a unique integration of vertically-mounted high-bypass-ration turbofans into a propulsive wing. The thrust from the tuorbofans can be deflected downward 100 degrees for use in vertical takeoff and landing.

The powered model will have a wing span of nearly five and one-quarter feet. The model will consist of a fuselage, propulsive wing, booms and tail. Wings will house four tip turbine fans to simulate the propulsive systems.

The propulsive wing will have movable flap-ailerons, which adjust from 20 degrees up to 100 degrees down, and a tail configuration consisting of twin outboard vertical fins and outboard horizontal control surfaces.

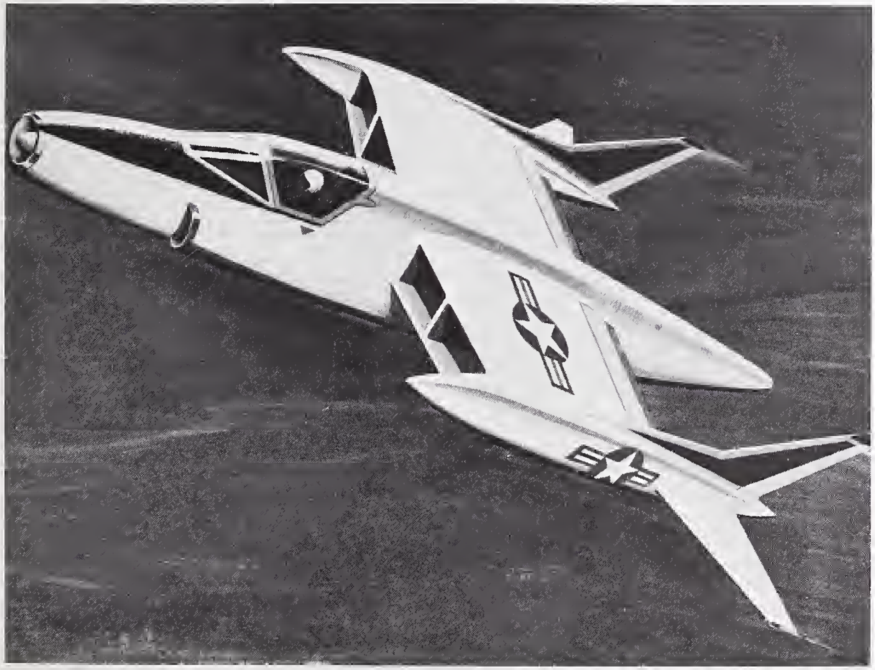
Wind tunnel tests at the National Aeronautics and Space Administration's Langley Research Center will include all flight modes. Low-speed tests in the 17-foot transition tunnel will evaluate the aircraft's vertical takeoff and landing, short takeoff and landing, and maneuvering capabilities. High-speed tests in the 16-foot tunnel will investigate effectiveness of the outboard tail, flap-ailerons and high-speed drag of the propulsive wing.

The propulsive wing design shows promise of good engine-to-airframe match in the cruise mode, a high mach number of drag divergence (which make high subsonic cruise flight possible) and relatively low downwash velocities and temperatures for vertical takeoff and landing.

Possible uses of the ADAM concept would be for an aircraft with a high subsonic strike-reconnaissance capability operating from widely dispersed landing sites, and vertical takeoff and landing transport aircraft.

The contract is the first undertaken by the Flight Dynamics Laboratory in its investigation of vertical-short-field takeoff and landing (V/STOL) aerodynamics. To expand its research capabilities in this area, the laboratory has established a V/STOL Aerodynamics Group in the Flight Mechanics Division.

Work on the 15-month contract on the ADAM II propulsive wing will be completed in May 1967.



ADAM II. An artist's concept shows a fighter aircraft which incorporates engines within the wing. With a 100-degree downward deflection of the aircraft's thrust, the fighter can operate from short landing fields in forward combat areas.

NORAD To Award Contracts on Command and Control Platform

The North American Air Defense Command has announced that contracts totaling more than $4 million will be awarded to develop a new air defense airborne command and control platform.

Since last summer, major aircraft companies have been doing feasibility studies for an airborne warning and control system (AWACS) for the Air Force. Boeing and Douglas Aircraft have been picked to conduct further studies aimed at completion of concept formulation in about a year.

It is expected negotiations will result in an award of contracts of $2,100,000 each to these companies.

Upon determination that an appropriate radar design is available, one of the contractors will be selected to develop prototype systems.

AWACS is envisioned as an automated airborne command and control system for world-wide use with air defense and tactical forces. It would use a high-performance, subsonic aircraft carrying radar, communications and data-processing equipment.

According to air defense experts, the system would make it impossible for enemy bombers to fly over, under, or around the radar surveillance network.

COIN

(Continued from Page 8)

the Navy Board of Inspection and Survey and an All-Service Evaluation Group.

Present Marine Corps requirements are for 100 OV–10A's which will be used for both visual and photographic reconnaissance, for escorting helicopters, for limited close air support, and for light cargo and personnel transport. In short, the OV–10A (COIN) is expected to be a versatile vehicle for the Marine Corps in the sort of environment which it now faces in Southeast Asia.

The Air Force has a current requirement for 157 OV–10A aircraft for use primarily in the forward air controller role.

The Army is closely monitoring the COIN development primarily for a vehicle to be used for electronic surveillance operations. More sophisticated electronic equipment would be required for this mission.

Military Assistance Program use of the COIN would need only a small amount of unsophisticated equipment. Firm commitments for this use are expected in the future.

CALENDAR OF EVENTS

Oct. 25-26: Ninth Navy/Industry Conference on Material Reliability, Washington, D.C.

Oct. 27-28: Tulsa Chamber of Commerce Air Festival, Riverside Airport, Tulsa, Okla.

Oct. 31-Nov. 2: Defense Supply Assn. National Convention, Benjamin Franklin Hotel, Philadelphia, Pa.

Nov. 2: Industrial Management Society Meeting, Chicago, Ill.

Nov. 2-4: Northeast Electronic Research & Engineering Meeting, Boston, Mass.

Nov. 2-4: Air Force/National Security Industrial Assn. Meeting, Patrick AFB, Fla.

Nov. 8-10: Joint Computer Conference, San Francisco, Calif.

Nov. 9: National Security Industrial Assn. Meeting, Naval Ordnance Laboratory, Corona, Calif.

Nov. 14-16: American Petroleum Institute Meeting, New York City, N.Y.

Nov. 15-17: Ships Control Systems Symposium, Annapolis, Md.

Nov. 17: Industrial Procurement Conference, Louisville, Ky.

Nov. 29-Dec. 2: American Institute of Aeronautics and Astronautics Annual Meeting and Technical Display, Boston, Mass.

Nov. 29-Dec. 1: American Society for Metals Meeting, Detroit, Mich.

Nov. 30-Dec. 2: Wire and Cable Symposium, Atlantic City, N.J.

Dec. 7: Pearl Harbor Day, Nationwide.

Dec. 4-8: American Institute of Chemical Engineers Meeting, Detroit, Mich.

Dec. 5-8: Chemical Specialities Mfg. Assn. Meeting, Hollywood, Fla.

Dec. 16: Wright Memorial Dinner, Aero Club of Washington, D.C.

Dec. 26-31: American Assn. for Advancement of Science Meeting, Washington, D.C.

Dec. 27-28: Industrial Relations Research Assn. Meeting, Chicago, Ill.

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Increased Tactical Aircraft Production Announced

Secretary of Defense made the following statement on Sept. 22, 1966, concerning increased production of tactical aircraft for FY 1968:

"You will recall that when I announced a cutback of approximately one billion dollars in the planned expenditures for air munitions production last July 11, I also announced that we were examining into production schedules for ground munitions, aircraft, helicopters and other large cost items.

"We have now completed a review of the tactical aircraft situation. In the case of air munitions, we found it prudent to decrease production rates while building to an air ordnance inventory of more than 500,000 tons within a year. Now we find it prudent to act to increase the production of tactical aircraft for FY 1968 by approximately 280 planes. The cost of the additional aircraft will amount to approximately $700 million.

"As you know, the FY 1967 defense budget was based upon the assumption that combat operations in Southeast Asia would continue to June 30, 1967. I told Congress repeatedly that if the conflict were to continue beyond that date we would have to adjust certain programs accordingly.

"Because of the long lead times involved in aircraft production, I have come to the conclusion that it is wise now to place on order aircraft that may be required to support operations beyond June 30, 1967.

"Our review was based on many factors, including projections on numbers and types of sorties and predicted loss rates. It takes into account all experience to date. Tactical aircraft production schedules for FY's 1966, 1967 and 1968 have been developed to insure that new deliveries of aircraft will exceed potential losses."

Project AIMS

Identification—Friend or Foe (IFF)

by
R. G. Stiles

With the advent of radar in the late thirties, it became necessary to identify in some way the friendly aircraft and other vehicles detected by these radars. This identification was required to prevent destruction by friendly anti-aircraft batteries, etc., and had to be accomplished by some sort of cooperative device in the aircraft or other vehicle itself. These devices were then, and still are, triggered by signals from the ship, aircraft, or ground installation requiring identification. The last 10 years have seen an increasing demand for better and more accurate identification equipment for aircraft and, in some instances, surface craft. The aircraft requirement applies not only to military vehicles, but also to aircraft in a civilian environment. To this end, improvements have been developed for the existing Mark X (SIF) series of IFF beacon equipments.

In 1961 the President directed that the Federal Aviation Agency (FAA) establish project BEACON for the express purpose of conducting "an engineering review of all aviation facilities and related research and development." This review was to result in a practical long-range plan to ensure efficient, safe and positive control of all aircraft within the United States.

Basically, the AIMS program is a DOD-directed project involving the Navy, Marine Corps, Air Force, Army and FAA. The Services require equipment in all categories of the program, while the FAA is involved in the air traffic control only.

This article will be devoted to the air traffic control portions of the program. In order to provide as near a common system as possible among the agencies involved, the AIMS program was established by DOD with the Air Force as the executive agent. The System Program Office (SPO) was established at Wright-Patterson AFB, Ohio, under the Aeronautical Systems Division (ASD). The program director has his headquarters there and coordinates and directs all aspects of the development and procurement of equipment. The Navy AIMS project was established by Chief of Naval Material charter in February 1965, although Navy AIMS responsibility in the program dated back to September 1963, when the DOD AIMS project was chartered. During this interval, the project/program managers in the IFF field in the Bureau of Naval Weapons and the Bureau of Ships were responsible for the coordination of the program among the Services and in conjunction with the several interested Bureau of Naval Weapons offices for the coherence of the program in the Navy itself.

In order to meet the requirements of the National Standard for Common System Component Characteristics for the IFF Mark X (SIF)/Air Traffic Control Radar Beacon Systems, much of the existing beacon equipment must be scrapped and new units provided. The new equipment involves the following major changes to the basic Mark X (SIF) System:

- The first feature will permit individual identification of aircraft, thus improving the air traffic control capabilities. This improvement also will lend itself to automatic control facilities.

R. G. Stiles, Dep. Project Manager, Navy AIMS Project Office, has been working as a civilian employee with the Navy Department since 1950. He was one of the original staff of the AIMS Project Office when it was established in 1965.

- The next added feature will be altitude reporting aiding the air traffic control functions and reducing the amount of traffic on the voice communications networks. The altitude reporting requirement necessitates changes to the airborne transponder, allowing it to reply to a new interrogation mode, and provide for the transmission of data encoded from altitude information. This means also that aircraft altimeter systems must be updated to meet the maximum error requirements of ± 250 feet established as the system goal and also to provide data fed to the transponder transmitter. To accomplish this, the altitude sensors must be either redesigned or relocated in the aircraft and a pick-off devised to encode altitude information to feed to the transponder.
- When airborne transponders are triggered by energy radiated in the side lobe pattern of the interrogator antenna, replies of a spurious nature are generated. These lead to errors in azimuth determination and also tend to produce noisome clutter on the display scope. To eliminate this problem side lobe suppression techniques must be applied to the circuitry, both in the transponder and in the interrogator.
- More clutter is added to the displays by non-synchronous replies, i.e., replies by a transponder to interrogations from other interrogators. These produce what is known as "fruit." To eliminate this situation, defruiting techniques must be developed to discriminate against replies to interrogators other than the one of immediate interest.
- In order to provide an improved IFF system, it will be necessary to increase the duty cycle of the interrogator transmitter and incorporate state of-the-art advances in the control circuitry for the transmitter. This necessitates some re-engineering effort which can be accomplished on a production contract.
- The final change necessary to the system will be to frequency stabilize the interrogator transmitter to tolerances specified by the national standard and not required in the earlier equipment.

In addition to the implementation of the specific capabilities noted above, the AIMS program is also responsible for the standardization of essential system characteristics among the Services. This permits meeting overall operational requirements on land, on the sea and in the air with a minimum of differences in equipment among all users.

The preceding paragraphs have presented the impact of the new system on the old and have shown the way the Services will handle the new operational equipment. Let us now turn to the system itself and determine how it works.

The scope of this project is such that large quantities of equipment in all categories will be procured. In general, contracts will be awarded on a competitive basis from approved AIMS specifications.

The AIMS system consists of interrogators—asking a coded question; transponders—replying to the coded question; computers—decoding both questions and responses; servoed altimeters—providing altitude information; and altitude encoder sets—providing coding information to the transponder for transmission to requesting interrogator.

As shown in Figure 1, the interrogators are included in all AIMS-equipped ground and surface sites and in some airborne vehicles. The interrogator is generally associated with, or slaved to, a primary radar and derives target azimuth and range information from this source. The transponders are utilized in aircraft to provide identity and altitude information, but can also play a useful role in identification of friendly surface craft and ground sites.

When the Navy AIMS project was chartered by the Chief of Naval Material, the project manager, Captain Norman D. Champlin, was assigned responsibility for the Navy portion of the AIMS program. Tasks involved include research, development, test and evaluation, acquisition and support of the AIMS systems, subsystems and equipment used by the Navy or by the other Services when assigned to the Navy for procurement by the Air Force SPO at Wright-Patterson AFB.

The project manager is also assigned responsibility for control of funds and budgeting. Systems engineering and system integration in the Navy area are his responsibility in accordance with such directives as may be handed down by the Air Force project director and also by the Chief of Naval Material.

The management of this project demonstrates the ability of the three Services to come up with and administer a common program. The efforts are reflected in reduced development and procurement costs and in the use of equipment common to all types of DOD activity. It has shown what progress can be made by the Services in conjunction with a civilian agency since the FAA is directly involved.

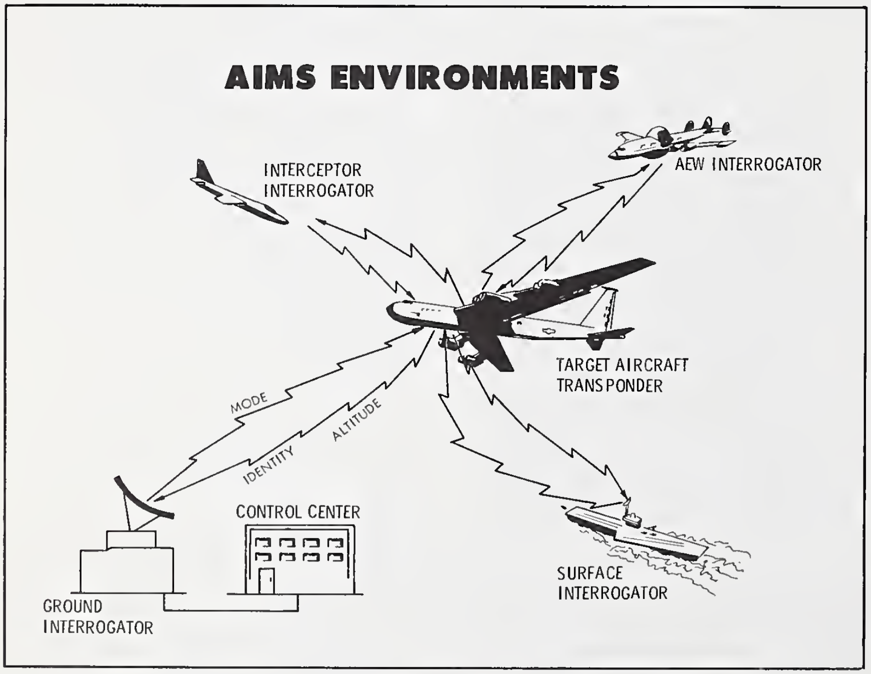

Figure 1.

Metalworking Technology To Be Subject of USAF Symposium at Las Vegas

A Metalworking Technology Symposium—the first in a series commemorating the golden anniversay of the Air Force Materials Laboratory, Wright-Patterson AFB, Ohio—will be held Jan. 10-13 in Las Vegas, Nev.

The purpose of the symposium is to review progress in Air Force-sponsored metallurgical processing programs and to forecast manufacturing methods requirements in this area for Air Force sponsorship in the next five years. The symposium, sponsored by the laboratory's Metallurgical Processing Branch, Manufacturing Technology Division, will feature technical sessions on forging, rolling, casting, extruding and drawing, powder metallurgy, composite materials, and specialized metalworking processes and equipment.

Technical papers representing significant technology developed under Air Force contract will be presented by project engineers from the Metallurgical Processing Branch and its contractors.

Approximately 500 representatives of Government, industry and universities are expected to attend. The meeting is open to Government contractors, Government personnel, and producers and users closely related to the production of aircraft and aerospace systems.

For further information contact the Metalworking Technology Symposium Department, Air Force Materials Laboratory, P. O. Box 7, Dayton, Ohio 45401.

MBT–70 Project Test Organization Established

The American test organization which will evaluate the joint United States-Federal Republic of Germany Main Battle Tank for the 1970's has been established.

The test program will be directed from the U. S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md., by Colonel Jack P. Libby, heading the new Systems Test Manager's Office, MBT–70.

A two-man international Program Management Board will consist of Major General W. G. Dolvin, representing U. S. interests, and Colonel Dr.-Ing. Helmut Schoenefeld, the German member.

U. S. prototypes will be routed to installations and activities of the Test and Evaluation Command in the continental United States and Alaska for engineering and service tests. German models will be tested concurrently at European proving grounds of the German army located at Trier, Munster-Lager and Meppen.

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DECEMBER 1966

SPEAKERS CALENDAR

DEPARTMENT OF DEFENSE

Mr. B. B. Lynn, Dep. Dir., Defense Contract Audit Agency, at the National Assn. of Accountants Meeting, Chicago, Ill., Nov. 14; at the Electronic Industries Assn. (Government Procurement Relations Dept.) Meeting, Colorado Springs, Colo., Nov. 17; at the New York State Society of Certified Public Accountants Meeting, New York City, N.Y., Nov. 30.

Lt. Gen. H. C. Donnelly, USAF, Dir., Defense Atomic Support Agency, at World Affairs Council Meeting, Pittsburgh, Pa., Nov. 17.

Maj Gen. J. B. Bestic, USAF, Dep. Dir. for National Military Command System Technical Support, Defense Communications Agency, at Information System Science and Technology Congress, L. G. Hanscom Field, Mass., Nov. 23.

DEPARTMENT OF THE ARMY

Mr. William P. Durkee, Dir., Office of Civil Defense, at U.S. Civil Defense Council Conference, Louisville, Ky., Oct. 24-28.

Lt. Gen. William F. Cassidy, Chief of Engineers, at Ports of Philadelphia Day Luncheon, Philadelphia, Pa., Oct. 28.

DEPARTMENT OF THE NAVY

RAdm. Pierre Charbonnet, Commandant, Eight Naval District, at Navy Day Dinner, New Iberia, La., Oct. 25.

Hon. Paul H. Nitze, Secretary of the Navy, at Navy League Dinner, New York City, Oct. 26; at Navy Day Celebration, Charleston, S.C., Oct. 27.

RAdm. J. McNair Taylor, Commandant, 12th Naval District, at Navy Day Lunch, Portland, Ore., Oct. 26.

Hon. Robert H. B. Baldwin Under Secretary of the Navy, at Navy Day Luncheon, New Orleans, La.; at Navy Day Dinner, Naval Air Station, Pensacola, Fla., Oct. 27.

Hon. Robert A. Frosch, Asst. Secretary of the Navy (Research & Development), at Industrial Conference, Washington, D.C., Oct. 27.

Adm. Thomas H. Moorer, Commander-in-Chief, Atlantic Fleet, at Navy Day Luncheon, Philadelphia, Pa., Oct. 27; at Navy League, Fort Lauderdale, Fla., Oct. 29.

RAdm. Henry L. Miller, Chief of Information, at Navy Day Celebration, Baton Rouge, La., Oct. 27; at Marine Underwriters Meeting, New York City, Nov. 17; at Navy League, San Antonio, Tex., Nov. 23; at Pearl Harbor Day Observance, Philadelphia, Pa., Dec. 7.

RAdm. D. F. Smith, Commander Naval Air Test Center, at Navy Day Lunch, Jacksonville, Fla., Oct. 27.

RAdm. J. W. Williams, Dep., Commander, Submarine Force, Atlantic Fleet, at Navy Day Dinner, Evanston, Ill., Oct. 27.

RAdm. E. J. Fahey, Commander, Naval Ship Systems Command, at Navy Day Luncheon, Cleveland, Ohio, Oct. 27.

RAdm. Noel A. M. Gayler, Asst. Chief of Naval Operations (Development), at Navy Day Dinner, Bremerton, Wash., Oct. 29.

RAdm. Harold G. Bowen Jr., Dep. Chief of Naval Operations (Development), at Ship Control Systems Symposium, Annapolis, Md., Nov. 15.

RAdm. R. Whitaker, Commanding Officer, Military Sea Transportation Service, at Navy League, Newark, N.J., Dec. 1.

DEPARTMENT OF THE AIR FORCE

Brig. Gen. E. L. Ramme, Dir., Supply and Services, Office of Dep. Chief of Staff (Systems and Logistics), at Defense Supply Agency Convention, Philadelphia, Pa., Nov. 1.

Hon. Robert H. Charles, Asst. Secretary of the Air Force (Installations and Logistics), at Chamber of Commerce, Granite City, Ill., Nov. 3.

Brig. Gen. E. B. Giller, Dir., Science and Technology, Office of Dep. Chief of Staff (Research & Development), at Society of Aerospace Materiels and Processing Engineers Meeting, San Diego, Calif., Nov. 10.

Lt. Gen. W. Austin Davis, Vice Commander, Air Force Systems Command, at Third Annual S. D. Heron Award Dinner, Wright-Patterson AFB, Ohio, Nov. 22.

Brig. Gen. J. S. Bleymaier, Commander, Air Force Western Test Range, at American Institute of Aeronautics and Astronautics Meeting, Boston, Mass., Nov. 29—Dec. 1.

AF Shifts TF-39 Engine Management

A shift in responsibilities for management of the TF-39 aircraft engine and an initial assignment for its maintenance and overhaul have been announced by the Air Force Logistics Command.

San Antonio Air Materiel Area, Kelly AFB, Tex., will assume the responsibilities of item manager and specialized repair activity for the TF-39, which will power the C-5A heavy logistics aircraft.

Oklahoma City Air Materiel Area, Tinker AFB, Okla., had previously been designated item manager.

Maneuvering Unit Under Development

Development of a Dual-purpose Maneuvering Unit (DMU) that can be worn by a space pilot or be operated by remote radio and television signals is now under way at the Air Force Systems Command's Research and Technology Division.

A one-year study contract to establish mission requirements for the DMU during the 1968-1972 time period, prepare a design, and build a full-scale lightweight mockup has been awarded to Bell Aerospace Corp.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 1965–June 1966	July 1964–June 1965
Procurement from All Firms	$34,877,967	$26,112,838
Procurement from Small Business Firms	7,611,496	5,304,803
Percent Small Business	21.8	20.3

DEPARTMENT OF D

SEC
HONORABLE ROBERT S McNAMAR
DEPUTY
HONORABLE CYRUS R VANCE

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

DIRECTOR, JOHN S FORSTER JR	3E1006	79111
DEP DIR, FINN J LARSEN	3E1D14	57178
DEP DIR (ADMIN, EVAL & MGT), L/G MARVIN L McNICKLE USAF	3E1030	74176
DEP DIR (ELEC & INFO SYS), T F ROGERS	3E11D	57345
DEP DIR (RESEARCH & TECHNOLOGY), DONALD M MacARTHUR	3E144	55036
DEP DIR (SOUTHEAST ASIA MATTERS), LEONARD SULLIVAN JR	3E1060	52754
DEP DIR (STRAT & SPACE SYS), D J FINK	3E130	79386
DEP DIR (TACTICAL WARFARE PROGRAMS), THOMAS P CHEATHAM	3E1040	59713
ADVANCED RESEARCH PROJECTS AGENCY: DIR, CHARLES M HERZFELD	3E160	78255
WEAPONS SYSTEMS EVALUATION GROUP: DIR, L/G JOS R HOLZAPPLE USAF		76335
DEFENSE SCIENCE BOARD: CHMN, FREDERICK SEITZ	3D1040	54157

* 400 Army-Navy Drive, Arlington, Va.

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DEP ASST SEC (MILITARY PERSONNEL POL), B/G WM W BERG, USAF	3C961	74166
DEP ASST SEC (RESERVE AFFAIRS), B/G J J IRVIN, USA	3C956	74222
DEP ASST SEC (MANPOWER PLANNING & RESEARCH), ROY K DAVENPORT	3D964	70555

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DEPUTY DIRECTOR, B B LYNN
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DEPUTY FOR RES MGT, H W KETTL
ASST DIR FOR REV & EVAL, F S H

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THE ASST TO THE CHAIRMAN, L/G G S BROWN, USAF	2E873	79121
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EXECUTIVE, COL J J WILSON	3E668	5211D

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EXECUTIVE, COL C I BENNETT	4E929	79225

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MILITARY SECRETARY, COL F C LAHUE	AA	2004	42501

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CHIEF, M/G J R RUSS

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CHIEF, B/G J D KEMP

SPECIAL AS

SPECIAL ASSISTANT,
M/G J C SH

SPECIA

SPECIAL ASSISTANT
R/A W M Mc

October 1966

ESE --- DIRECTORY*

DF NSE	3E880	55261
TARY DEFENSE	3E921	56352

ASSISTANT SECRETARY OF DEFENSE COMPTROLLER

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ASST SEC (MANAGEMENT)	3A882	78580

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DEP ASST SEC (PROCUREMENT), JOHN M MALLOY	3E760	78177
DEP ASST SEC (PROPERTIES & INSTALLATIONS), EDWARD J SHERIDAN	3E760	79155
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DEP ASST SEC (FAMILY HOUSING), JOHN J REED	3E772	57804
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DEP ASST SEC (PLANNING & NORTH ATLANTIC AFFAIRS), FREDERICK S WYLE	4E820	78101

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P ASST SEC (STRATEGIC PROGRAMS), FRED S HOFFMAN	3A882	50721
P ASST SEC (GENERAL PURPOSE PROGRAMS), RUSSELL MURRAY 2d	3E838	57191
P ASST SEC (ECONOMICS), STEPHEN ENKE	2E812	50528
P ASST SEC (RESOURCE ANALYSIS), HAROLD ASHER	3E812	57341
IR, COMMAND, CONTROL, COMMUNICATIONS & INTELLIGENCE, HERBERT D BENINGTON	2B256	50881

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MIL ASST, CAPT F COSTAGLIOLA, USN	3E1074	75161
MIL ASST, COL E F BYERS, USAF	3E1074	75162
MIL ASST, COL R RAY, USA	3E1074	75162

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	4C346	88282
3E	4A165	88323
	4A350	88308
	4A415	88351

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EXEC DIRECTORATE, TECHNICAL & LOGISTICS SERVICES, B/G WILLIAM L HAMRICK, USAF	4D530	81771

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UNDER SECRETARY, HON DAVID E McGIFFERT		2E722	54311
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ASA (FM), HON W BREWSTER KOPP		2E678	54291
ASA (I&L), HON ROBERT A BROOKS		3E606	52254
CH, PUB INFO, M/G KEITH L WARE		2E636	55135
CHIEF OF STAFF, GEN HAROLD K JOHNSON		3E668	52077
VCS, GEN CREIGHTON W ABRAMS JR		3E668	54371
DCS/OPS, L/G VERNON P MOCK		3E648	52904
DCS/PER, L/G JAMES K WOOLNOUGH		2E736	56003
DCS/LOG, L/G LAWRENCE J LINCOLN JR		3E560	54102
COMPTROLLER, L/G FERDINAND J CHESAREK		3A720	52510
CHIEF OF R&D, L/G AUSTIN W BETTS		3E412	78186
ACSFOR, L/G JAMES H POLK		3E468	55775
CofENGRS, L/G WILLIAM F CASSIDY	Tempo	7 1230	52052
CofFINANCE, M/G WILLIAM C HANEKE	Nassif	316	44336
IG, M/G JAMES A RICHARDSON III	Y&D An	1B3	52883
PMG, M/G CARL C TURNER	MnNavy	1072	62824

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UNDER SECRETARY, HON ROBERT H B BALDWIN		4E728	53141
ASN (I&L), HON GRAEME C BANNERMAN	MN	2046	63213
ASN (FM), HON CHARLES F BAIRD		4E748	72325
ASN (R&D), HON ROBERT A FROSCH		4E736	56315
CH INFO, R/A HENRY L MILLER		4C719	77391
CH NAVAL RESEARCH, R/A JOHN K LEYDON	MN	0449	64911
COMPTROLLER, HON CHARLES F BAIRD		4E748	72325
DIR, OFF OF MGT INFO, CAPT JAMES M BROGAN		5E781	57051
DIR, OFF OF NAVAL PETROLEUM & OIL SHALE RESERVES, CDR O R BUTTERFIELD	Mun	B1848	68966
CNO, ADM DAVID L McDONALD		4E660	56007
DCNO (AIR), V/A PAUL H RAMSEY		4E394	52374
DCNO (DEV), R/A HAROLD G BOWEN JR		5C710	75533
DCNO (FO&R), V/A JOHN B COLWELL		4E552	77469
DCNO (LOG), V/A LOT ENSEY		4E606	52154
DCNO (M&NR), V/A BENEDICT J SEMMES JR		4E470	55588
DCNO (P&P), V/A ANDREW McB JACKSON JR		4E584	53707
DIR, NAVY PROG PLANNING, V/A E P HOLMES		4E618	52688
DIR, ANTISUB WARFARE PROG, V/A C B MARTELL		5D569	71098
DIR, LONG RANGE OBJ GP, R/A GEORGE H MILLER		4A724	52758
CHIEF, NAVAL MATERIAL, V/A I J GALANTIN	MN	2010	68500
CDR, NAVAIRSYSCOM, R/A ALLEN M SHINN	MN	2082	62465
CDR, NAVELECSYSCOM, R/A JOSEPH E RICE	MN	3006	61229
CDR, NAVSHIPSYSCOM, R/A EDWARD J FAHY	MN	3046	62058
CDR, NAVORDSYSCOM, R/A ARTHUR R GRALLA	Mun B	3032	68033
CDR, NAVSUPSYSCOM, R/A H J GOLDBERG	MN	0026	63412
CDR, NAVFACENGCOM, R/A A C HUSBAND	Y&D An	2A59	50411
CDR, MSTS, V/A GLYNN R DONAHO	T-8	1004	66649
COMDT OF MARINE CORPS, GEN W M GREENE JR	AA	2004	42500
DCS (P&P), L/G HENRY W BUSE JR	AA	2020	42508
DCS (RD&S), B/G E E ANDERSON	AA	2305	42871
DCS (AIR), M/G K B McCUTCHEON	AA	2313	41023
DIR OF INFO, B/G F E GARRETSON	AA	3202	42958

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UNDER SEC, HON NORMAN S PAUL		4E871	71361
ASAF (R&D), HON ALEXANDER H FLAX		4E968	76361
ASAF (I&L), HON ROBERT H CHARLES		4E856	78147
ASAF (FM), HON LEONARD MARKS, JR		4E978	72302
DEP UNDER SEC (INTERNATIONAL AFFAIRS), PHILIP F HILBERT		4D934	53789
DIR, INFO, M/G E B LeBAILLY		4D922	76061
DIR, SPACE SYSTEMS, B/G JAMES T STEWART		4C1000	78675
DIR, MOL PROGRAM OFFICE, M/G HARRY L EVANS		5D227	50961
CHIEF OF STAFF, AIR FORCE GEN JOHN P McCONNELL		4E929	79225
VICE CHIEF OF STAFF, GEN BRUCE K HOLLOWAY		4E936	57911
DCS/R&D, L/G JOSEPH R HOLZAPPLE		4E334	76957
DCS/PER,		4E194	56162
DCS/SYS & LOG, L/G THOMAS P GERRITY		4E262	53153
DCS/P&O, L/G KEITH K COMPTON		4E1020	79991
COMPTROLLER, L/G JACK G MERRELL		4E126	71974
DCS/P&R L/G ROBERT J FRIEDMAN		4E1006	55226
INS GEN, L/G GLEN W MARTIN		4E1076	76733
SURGEON GEN, L/G RICHARD BOHANNON	T-8	2718	69315
USAF SCIENTIFIC ADV BD, H G STEVER		5D1014	74811

D CONTROL GROUP		
	1D828	76406
AGENCY		
	1D956	57769
TRATEGIC MOBILITY		
	2E844	50953
DR ARMS CONTROL		
N	1E968	71227

JOINT SECRETARIAT

SECRETARY, JCS, R/A L R VASEY, USN	2E935	72700

DIRECTORATE OF ADMINISTRATIVE SERVICES

DIRECTOR, COL J MILLIKIN JR, USA	2D947	74987

SPECIAL ASSISTANT FOR MILITARY ASSISTANCE AFFAIRS

SPECIAL ASSISTANT, M/G E C D SCHERRER, USA	1E843	75225

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DEFENSE ATOMIC SUPPORT AGENCY

DIRECTOR, L/G H C DONNELLY, USAF	1B668	56375
EXECUTIVE OFFICER, COL JE MINAHAN,USA	1B668	55338

DEFENSE COMMUNICATIONS AGENCY

(Bldg. 12, Naval Service Center, 8th and South Court House Road, Arlington, Va.)

DIRECTOR, L/G ALFRED D STARBIRD, USA	4225	43155
CHIEF OF STAFF, M/G W T SMITH, USAF	4225	43157

DEFENSE INTELLIGENCE AGENCY

DIRECTOR, L/G J F CARROLL, USAF	3E258	57353
EXEC, COL H G CREYTS, USAF	3E258	78844

AUG 15, 1966

MEETINGS AND SYMPOSIA

OCTOBER

Colloquium on the **Photographic Interaction Between Radiation and Matter**, Oct. 26-27, at Washington, D.C. Co-sponsors: Air Force Office of Scientific Research and the Society of Photographic Scientists and Engineers. Contact: Dr. Amos G. Horney (SRC), Air Force Office of Scientific Research, Washington, D.C. 20333. (Area Code 202) OXford 6-8705.

NOVEMBER

25th Anniversary Symposium on **Personnel Research and System Advancement**, Nov. 1-3, at San Antonio, Tex. Sponsors: Personnel Research Laboratory and Southwest Research Institute. Contact: Jack Harman, Southwest Research Institute, San Antonio, Tex. (Area Code 512) OV 4-2000.

Ship Control System Symposia, Nov. 15-17, at Annapolis, Md. Sponsor: U.S. Navy Marine Engineering Laboratory. Contact: Walter J. Blumberg, Steering Committee Chairman, USN Marine Engineering Laboratory, Annapolis, Md. (Area Code 301) 268-7711, ext. 8670.

Fifth Annual Symposium on **Physics of Failure in Electronics**, Nov. 16-18, at Columbus, Ohio. Co-Sponsors: Battelle Memorial Institute and the Rome Air Development Center. Contact: Joseph Schramp (EMERP), Rome Air Development Center, Griffiss, AFB, N.Y. 13442.

Third Annual **Failure Analysis** Seminar, Nov. 17-18, at the NASA Manned Spacecraft Center, Houston, Tex. Co-sponsors: Texas Chapter of the American Society for Metals and NASA Manned Space Center. Contact: Dr. David E. Hartman, Houston Research Institute, Inc., 6001 Gulf Freeway, Houston, Tex. 77023. (Area Code 713) 928-5001.

Third Congress on **Information Systems Science and Technology**, Nov. 21-22, at Buck Hill Falls, Pa. Co-Sponsors: Electronic Systems Div., (AFSC), and Mitre Corp. Contact: Col. C. A. Laustrup (ESRC), Project Officer, Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. 01731. (Area Code 617) 271-4527.

Symposium on the **Structure of Surfaces**, date undetermined, at Durham, N.C. Sponsor: Army Research Office-Durham. Contact: Dr. H. M. Davis, Dir., Metallurgy and Ceramics Div., Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706. (Area Code 919), 286-2285, ext. 31.

DECEMBER

15th Annual **Wire & Cable** Symposium, Dec. 7-9, at Atlantic City, N.J. Sponsor: Army Electronics Command. Contact: Milton Tenzer, Electronic Parts and Materials Div., Electronics Components Laboratory, Army Electronics Command, Fort Monmouth, N.J. 07703. (Area Code 201) 535-1834.

Fourth Symposium on **Unconventional Inertial Sensors**, Dec. 6-7, at the Department of State Auditorium, Washington, D.C. Sponsors: Naval Air Systems/Ordnance Systems Commands; Research & Technology Div., (AFSC), and the Institute of Navigation. Contact: Capt. Ross E. Freeman, USN (Ret.), Executive Dir., Institute of Navigation, Suite 912, 711 14th St., N.W., Washington, D.C. 20005. (Area Code 202) 783-3296.

American Ordnance Assn. Symposium on the **Fabrication and Utilization of Lightweight Armor**, (Classified), Dec. 13-14, at the Army Tank-Automotive Center, Warren, Mich. Sponsor: American Ordnance Assn. Contact: Director for Advisory Service, American Ordnance Assn., Transportation Building, Washington, D.C. 20006.

First **Nuclear Criticality Safety** National Topical Meeting, Dec. 13-15, at Las Vegas, Nev. Sponsors: American Nuclear Society and organizations and contractors of the Atomic Energy Commission, NASA and the Air Force. Contact: A. J. Smith, Nuclear Reactor Safety Group (WLAS-1), Air Force Weapons Laboratory, Kirtland AFB, N.M. 87117.

SAIMS

(Continued from Page 15)

indicate what and where the problems are.)

- The contractor will plan his cost and schedule accomplishment upwards within his own organization, i.e., beginning at the level of first line supervision.

The acceptance of this approach will foster an environment in which Government and industry can better resolve the issue of the management interface where major Defense programs of critical consequence are concerned. The essential nature of relationships and responsibilities in these matters has yet to be resolved. What is basic in deciding on an acceptable arrangement is that there be good visibility and clear communication in those programs in which contract completion is a matter of vital concern.

The visibility promoted through the specification approach will be provided under the following conditions:

- No major changes should be required to the contractor's existing work authorization, budgeting and accounting systems.
- Common terms and report formats will be employed to maximize understanding.
- Problem areas can be identified in detail by element of cost and organizational responsibility.
- A contractor may change and improve the details of his internal control system so long as he continues to meet the basic criteria.
- Flexibility in accounting for contingencies will communicate better information for management.
- The accomplishment of technical (product) performance goals can be related to the information framework for recording cost and schedule accomplishment.

While current development of the standard DOD specification is being carried on within OSD, a separate effort in the same direction is being implemented by the Air Force Systems Command (AFSC) procurement activities. The OSD effort is currently undergoing industry coordination and will undoubtedly supersede any individual Service planning and control system specifications or procedures after the coordination process is completed. In view of some evidence of confusion about the source of documents which have been developed in this subject area, draft or discussion materials circulated during the development process should be examined to distinguish the DOD draft version of the specification from that originated within the Air Force by AFSC.

FROM THE SPEAKERS ROSTRUM

Address by Hon. Robert A. Frosch, Asst. Secretary of the Navy (Research and Development), at the Institute of Electrical and Electronic Engineers Ocean Electronics Symposium, Honolulu, Hawaii, Aug. 29, 1966.

Hon. Robert A. Frosch

National Oceanographic Program

* * * *

It is customary in discussing oceanography to point out, first, its vital importance to our national defense, a fact which certainly cannot be exaggerated and, second, to catalog the fabulous wealth that lies in the sea—wealth in the form of minerals and chemicals that will soon be in short supply on land and wealth in the form of food and fresh water for an already protein-starved and water-starved world.

Because these facts are known to most of you here, I will not elaborate on them.

Instead I would like to take a few minutes to invite your attention to very recent developments which will have a profound and almost immediate effect on the whole field of oceanography, both military and non-military.

The first is the Marine Resources and Engineering Development Act of 1966 which President Johnson signed into law on the 17th of June.

We are fortunate in having in the Congress at this point in our history a number of perceptive congressmen who have taken the time to make a thorough study of oceanography and its importance to the national welfare. This law is the result of careful consideration and intelligent compromise on the part of these gentlemen.

Though the dollar expenditures will probably not be the same, this law will escalate the national oceanographic program to the same level of public interest and awareness as accrued to the space program from the National Space Act of 1958.

Oceanography is defined in many ways depending upon the individual discussing the subject. The law has adopted the board view, prevalent in Congress and in industry, that oceanography connotes far more than scientific study. In this law the term, marine science, is applied to oceanographic and scientific endeavors and discipline as well as engineering and technology in and with relation to the marine environment (marine environment including the oceans and the Great Lakes as well as their boundries).

The law sets up a National Council on Marine Resource and Engineering Development to be headed by the Vice President of the United States and made up of cabinet members and agency heads with a major statutory interest in the field. I was privileged to attend the first meeting of this national council less than two weeks ago.

It is certainly obvious to all of us who attended this first meeting that the Vice President has had a long standing personal interest in oceanography, and intends to devote whatever personal time is needed to carry out this aspect of his duties. I can assure you that this administration is taking the challenge of ocean exploration most seriously. Although the life of this national council is limited to a period of about 22 months, it has a statutory set of purposes "to develop, encourage, and maintain a coordinated, comprehensive, and long range national program in marine sciences for the benefit of mankind." It is the policy of this administration to use the council as a policy-making body to expand scientific understanding of the oceans, to accelerate the development of marine resources, and to establish an engineering capability to realize the full potential of the oceans in contributing to our national security and well being.

The act requires the council to prepare an annual report on the National Oceanographic Program for the President to transmit to the Congress. The report will describe Federal multi-agency programs, evaluate these activities, and will set forth recommended funding for all participating agencies during the succeeding fiscal year.

This council's other responsibilities are:

- To advise and assist the President in an annual review of Federal programs, surveys of such activities and steps to coordinate the activities of all agencies.
- To develop long range policy studies of the potential benefits of the oceans to the U. S. economy, security, health and welfare, including a study explicitly aimed at international legal problems.
- To evaluate and interpret the study report to be developed by the citizens' commission before it is transmitted to the President.
- To coordinate a program of international cooperation in work pursuant to marine science activities.

Dr. Ed Wenk was appointed by the President as the new executive secretary to the council and was sworn in by the Vice President at the first national council meeting. He will be the Vice President's right hand man for matters under the jurisdiction of the national council. Dr. Wenk was formerly Chief of Congress' Science Policy Research Staff and the Legislative Reference Service of the Library of Congress, and before that Executive Secretary of the Federal Council for Science and Technology. He has made major personal contributions to the design and engineering of deep submersibles.

The law further empowers the President to appoint a commission on marine sciences, engineering and resources to be composed of 15 members from industry, universities and maraine laboratories as well as the Federal and state governments. This citizens' commission is given up to 18 months to study and to recommend to the President of the United States and Congress an overall plan for present and future needs. The President expects to announce appointments to this commission within the next few weeks.

As chairman of the Interagency Committee on Oceanography, I have been directed by Dr. Horning, the President's Science Advisor and Chairman of the Federal Council for Science and Technology, to cooperate in every manner with the national council.

In summary, we now have a national policy council on oceanography at the very highest level in Government chaired by the Vice President of the United States. Under the umbrella of this council, the Interagency Committee on Oceanography (ICO) will discharge its responsibilities and the staff of the ICO will completely support the work of the council. We hope that arrangements can be made so that the council can call on the citizens' commission or its individual members and staff, as a group of experts in and out of Government, to act as advisers to this national council. Thus we will have everyone in the Federal Government engaged in oceanography pulling together under the policy direction of the Vice President to come up with recommendations to the President of the United States to carry out the statutory set of purposes under this new act.

Now, I don't want to second-guess the findings of a commission that is yet to be appointed and a policy council that has just met for the first time, but I do think that a long shadow has been cast toward the future by the report of the Panel on Oceanography of the President's Science Advisory Committee (PSAC).

The report is entitled "Effective Use of the Sea" and is available from the Superintendent of Documents at the Government Printing Office for 60 cents. You couldn't make a better investment—perhaps most of you have already made your investment. You don't have to agree with everything in it (and, parenthetically, I have found no one who does) to realize that it is a significant report, which is going to affect the shape of things to come in oceanography.

The PSAC report defines oceanography as all "activities within the ocean that have significant scientific or technological content." This definition is in keeping with the broad popular meaning given to oceanography over the past few years.

The title, "Effective Use of the Sea," comes from the recommendation that the national objective of our ocean program should be "effective use of the sea by man for all purposes currently considered for the terrestial environment."

An attempt to answer the question, "What is the proper role of the Federal Government in oceanography?" is indicated by their statement that "division of effort among Government, industry, and universities appropriate to land-based activities is advisable for the oceans and that the Federal Government should not preempt these activities to the extent it has, for example, in space."

Assigning highest priority to those efforts in oceanography that deal with national security, the report discusses the increasing need for the Navy to be prepared to defend the developing interest in all depths of the ocean, and to provide for the continuing projection of U. S. power on and under the oceans in an era of increasing sophistication in the use of the seas. This leads the report to recommend expansion of Navy capabilities which will permit operation anywhere within the oceans at any time. As you know, the Navy has under way a Deep Submergence Systems Project including Man-in-the-Sea. This report further asserts that this effort as presently constituted is insufficient if the Navy is to meet its goals in a reasonable time period.

The report recommends assignment of Federal program responsibilities for Man-in-the-Sea and undersea technology to the Navy. Thoughts and plans are relatively inexpensive. To put them into effect costs money. As the result of a study which proposed a plan for the Navy's future role in undersea technology, the Navy has included a new line item in the FY 1968 budget request, entitled "Deep Ocean Technology."

I fully support the Chief of Naval Operations in his statement before the Navy League that the Navy will require improved capabilities in its undersea strategic forces, antisubmarine warfare forces, as well as the ability to perform undersea search and recovery operations. Improvement of the Navy's capabilities in these areas depends largely on our national ability to discover and exploit new knowledge in ocean science and our success in developing new and relevant ocean technology.

We have seen a new horizon emerging, centering on our capability to engineer the oceans. We now face problems attendant upon our ability to explore the oceans, to exploit the oceans, and to occupy portions of the oceans' bottom.

I join the Secretary of the Navy, who for years has been convinced that the general area of ocean exploration and exploitation offers a challenge just as great as that posed by the current exploration of outer space, and that it will ultimately require a national effort on a comparable scale.

Our oceanographic programs are dramatic. They have captured the imagination of the public, foreign and domestic. To say the least, they are interesting, to you and to all engineers and scientists.

I urge you to keep informed on these programs and national developments in oceanography and to prepare to work with us on the important and fascinating problems in this exciting field. It should be clear that while the Navy will lead in ocean technology, it will really be a national effort, a corporate endeavor: science, industry, and the Navy.

In summary, the PSAC oceanography report recommends that the nation's oceanographic activities be supported by the Navy "in discharging its mission of national security through its laboratories and industry and through the Office of Naval Research support of civilian institutions, as well as by its supporting role in the development of undersea technology and provision of national test facilities."

In the civilian sector the report deals at length with the role of oceanography in facilitating the underwater recovery of oil and minerals, in providing fish protein and technology for a protein-starved world and with many other subjects such as water pollution, conversion of salt water to fresh, the role of the oceans in world weather.

The specific recommendations assigned the highest priority in the civilian sector to its development of food resources and the development of the capability for environmental prediction. The development of coastal regions for recreation and commerce were assigned a very high priority and the development of a modern hydrographic survey technology was assigned a high priority.

The establishment of marine study centers; marine wilderness preserves; deep sea and tropical laboratories and facilities for specialized marine studies; and a national center for collection, maintenance and distribution of living marine organisms are recommended in the report.

Since oceanography has progressed rapidly and many clearly identifiable problems exist, the report recommends a shift away from broad ocean surveys to solutions of specific problems. The need for oceanographers to evolve some fairly elaborate measuring arrays, with limited regions heavily instrumented, led to the recommendation for a step-by-step buoy program.

In discussing oceanographic research the report recommends that oceanographic research ships be separately funded as a block, and be grouped generally into regional fleets of reasonable size.

The major organizational recommendation would combine the Environmental Sciences Services Administration, Geological Survey, Bureau of Commercial Fisheries, and oceanographic activities of the Coast Guard and the Bureau of Mines in a single agency. This new agency would support the national effort by management of environment and ocean resources and providing description and prediction services through a balanced program of direct participation and support of industry and universities.

At the request of the President, each Federal agency is considering the recommendations contained in "Effective Use of the Sea." The ICO is now in the process of examining the implications of these recommendations and the Vice President regards the analysis of the PSAC report as one of his council's priority assignments, and expects to utilize the next council meeting for this purpose. In his charge to the Vice President, the President requested the National Marine Council to carefully study the many recommendations of the report and to consider these proposals in developing suggestions for the President for 1968.

At this time I can speak only for the Navy. Budgets permitting, the Navy intends to follow its recommendations. In the field of oceanography we feel an obligation to the entire nation. Almost every bit of oceanographic information gathered is not only of use to the Navy, but also to others in the oceanographic community. For instance, the work we do on sonar can be used to develop methods for studying the migratory habits of fish.

It is obvious that while pursuing military objectives, the Navy has an obligation to the national interest in ocean technology. We would like to see Navy dollars do double duty in supporting the civilian sector. In addition, the Navy accepts the responsibility for helping to develop the national undersea technology needed for effective use of the sea in the military, economic, social and political sense. This, again, must be a corporate venture: a science-industry-Navy team.

To be certain that the Navy's portion of the National Oceanographic Program budget is carefully and wisely invested, the Secretary of the Navy and the Chief of Naval Operations have completed taking another long, hard look at the entire Navy oceanographic program. They have thought in terms of a more centralized authority to give even a better focus to the entire Navy program in oceanography and related efforts.

The Secretary of the Navy, the Honorable Paul Nitze, has taken an action that will not only strengthen the Navy's oceanographic program but increase the Navy's ability to cooperate with all other agencies involved in our national oceanographic effort.

Effective immediately, the Secretary has established a new office of the Oceanographer of the Navy and invested it with the necessary expanded authority to provide centralized direction of all the Navy's oceanographic activities.

The new office will be headed by Rear Admiral O. D. Waters, Jr., who has been serving in the more limited position previously designated as Oceanographer of the Navy and also as Commander of the U. S. Naval Oceanographic Office.

Since the Secretary's instruction is not long and since it is written in the plain English for which he is noted, I will quote it to you in its entirety:

> **"This instruction defines the Naval Oceanographic Program, establishes an Office of the Oceanographer of the Navy, and prescribes the mission of the Oceanographer of the Navy.**
>
> **"The Naval Oceanographic Program encompasses that body of science, technology, engineering, operations, and the personnel and facilities associated with each, which is essential primarily to explore and to lay the basis for exploration of the ocean and its boundaries for Naval applications to enhance security and support other national objectives.**
>
> **"The mission of the Oceanographer of the Navy is to act as the Naval Oceanographic Program Director for the Chief of Naval Operations, under the policy direction of the Secretary of the Navy, through the Assistant Secretary of the Navy (Research and Development), and to exercise centralized authority, direction and control, including control of resources, in order to insure an integrated and effective Naval Oceanographic Program.**
>
> **"In carrying out his assigned responsibilities, the Oceanographer of the Navy is authorized to issue directives, management plans, requirements, tasks, instructions, and to allocate resources for the Secretary of the Navy and the Chief of Naval Operations.**
>
> **"The Chief of Naval Research is assigned additional responsibility as Assistant Oceanographer of the Navy for Ocean Science.**

"The Chief of Naval Material, with approval of the CNO, has assigned the Deputy Chief of Naval Material (Development) additional responsibility as Assistant Oceanographer of the Navy for Ocean Engineering and Development.

"With the approval of the CNO, the Oceanographer of the Navy will designate an Assistant Oceanographer of the Navy for Oceanographic Operations. Pending this designation, the relationships of the Oceanographer of the Navy and the U. S. Naval Oceanographic Office remain as at present.

"The Oceanographer of the Navy shall budget, justify, and administer all funds allocated to the Naval Oceanographic Program as required for implementation of the program, shall insure that adequate funds are budgeted by activities of the Navy Department for support of the program; and shall develop and maintain a comprehensive budget documented for presentation to higher executive authorities and Congressional Committees.

"All national facilities, centers, and missions of the National Oceanographic Program assigned to the Department of the Navy will be managed and administered by the Oceanographer of the Navy.

"The Office of the Oceanographer of the Navy is hereby established directly under the Chief of Naval Operations.

"The Oceanographer of the Navy, under the Chief of Naval Operations, shall command the Office of the Oceanographer of the Navy.

"The Chief of Naval Operations shall issue the necessary directives to implement the provisions of this Instruction."

That is the end of the Secretary's instruction. Its unequivocal language leaves no doubt that the Navy views its work in oceanography as a major portion of its effort to maintain the defense of the nation at sea, and that it is organizing its resources to make a major contribution to the national effort; a team effort among the academic community, industry, state and Federal agencies sharing the responsibility to work together under the leadership of the President and Vice President of the United States.

Address by Lt. Gen. H. C. Donnelly, USAF, Dir., Defense Atomic Support Agency, at Rotary Club Meeting, Albuquerque, N. M., Sept. 29, 1966.

Lt. Gen. H. C. Donnelly, USAF

The Frontier of Technology

The character of technological progress is CHANGE. In fact, the one thing that is constant in life today is CHANGE. We have seen many changes in our lifetime, but these are only a prelude to what the future holds. The changes to come could be the most significant ever faced in the history of man. I hope that we can be farsighted enough to take the right kind of action as these changes occur.

Farsightedness today is a very desirable characteristic; and speaking of farsightedness reminds me of the little girl whose father took her to the zoo to see all the wild animals. On viewing the lion pacing back and forth in his cage, the little girl looked troubled, and her dad asked her what was the matter. "Daddy," she replied, "If that lion gets out of his cage and eats you up, what bus do I take home?" That's being farsighted!

There are many categories of change about which we have to be farsighted. The population explosion, the role of computers, and a host of other matters warrant our attention; but since I'm in the nuclear business, I'm going to talk mainly about the changes that have and will come to us through nuclear technology.

My association with nuclear technology has been fixed primarily in the weapons area. The potential of nuclear energy, however, by no means begins nor ends with defense. The frontier that opened up with the discovery of fission is as broad and full as our scientific curiosity wills it. But nuclear weapons have captured the lion's share of the headlines.

For example, the atmospheric tests of nuclear weapons by France and Red China renewed world-wide concern about radioactive fall-out. But this new concern has been considerably less than was felt in the past, because now we understand more about radiation. We know that mankind has lived with radiation from things in nature ever since we first appeared on this earth. And we know that this natural background radiation is many times greater than the amount to which present fallout may expose us. Without implying that radioactive fallout is not a hazard, we can think of it as less harmful than the polluted air around the world's industrial cities. More than a thousand deaths resulting from smog were recorded in 1909 in Glasgow, Scotland. In 1948, twenty people died from the contaminated air of Donora, Pa. In December 1952, four thousand deaths in London were attributed to smog. Fallout from nuclear explosions has yet to compile such a record.

Strangely enough, the chances are pretty good that nuclear energy will help us reduce air pollution substantially within this century. For other reasons, primarily economic, this help already has begun in places such as Pittsburgh and Chicago where commercial nuclear power plants are in operation. Such plants need no combustion air and emit no toxic gases. They do not contribute to air pollution. With each substitution of a nuclear plant for one that operates on fossil fuels, a reduction in air pollution results.

Because large scale nuclear power production is beginning to offer a distinct economic advantage, it's probable that large areas of the United States one day soon will use electricity generated by nuclear power plants. Some of the contamination of our air from coal and oil burning generator plants thus will be eliminated. This also would be true of nuclear power applications in manufacturing plants.

Air pollution also may be reduced even more in the future by the use of electric-drive automobiles. The batteries would be charged at service stations that pump volts instead of gallons. The tiger in the tank will become a sort of electric eel! The primary source of energy for these service stations again would be a nuclear power plant. It's conceivable that the same large nuclear power plants on our technological frontier will do more than light and heat our homes and service facilities, run our industry and power our automobiles. These same plants could also operate desalting plants located near the oceans and help to supply us with fresh water. In fact plants of this kind are now under construction in California. Just imagine what a large supply of relatively inexpensive fresh water would mean to the Southeast and Far West. The Southwest has a special interest in this stretch of the nuclear frontier.

This rich land of America that we know today could not have been developed if human muscle and animal strength had been our only sources of energy. The industrial revolution which made our good life possible depended primarily on coal, gas and oil—the fossil fuels. In the United States today we have six percent of the world's population, but we use about 35 percent of the world's energy output. Our reserves of fossil fuels are large. But we are forced to see that they are limited when we recognize that world energy demands increase annually at a rate of about three and one-half percent. We are expanding our nuclear frontier simply because we must.

There is another reason why we will be compelled to push forward into the nuclear future. Through our use of fossil fuels, we are adding some six billion tons of carbon dioxide to our atmosphere each year. Aside from being a health hazard, this pollution has given rise to the prediction that a climatic change could result within the next few decades, a warming up of the atmosphere that could melt the polar ice sufficiently to flood our costal areas beneath a rising ocean.

I've confined my remarks so far to our nuclear potential in the areas of light and heat and mechanical power. And I've done no more than scratched the surface of possible applications. I haven't tried to cover everything because I don't want to keep you here all afternoon. I want to have time in my crystal-balling to touch on some of the benefits to be found in other areas of nuclear technology. The first of these is related to our nuclear weapons effects research in the Defense Atomic Support Agency.

As you know, we conduct nuclear tests underground. This, of course, is part of our defense mission and one of the requirements of our Safeguards Program under the Limited Test Ban Treaty. In the future, however, underground nuclear explosions may be an aid in the mining industry or in creating large underground reservoirs for gas, oil, or water. One project of particular interest to New Mexico is the "Gasbuggy" test proposed by the Atomic Energy Commission (AEC), the Bureau of Mines and the El Paso Natural Gas Company. The San Juan Basin, covering the northwest corner of this state and spilling over into Arizona and Colorado, has been recommended as the site of a nuclear fracturing experiment to increase production from a natural gas field. Fracturing refers to cracking the formation rock to induce greater production. If the process proves commercially feasible, it might be employed to advantage in the other Rocky Mountain natural gas fields.

A similar project to study the use of nuclear explosions to increase oil productivity from shale is under way.

Nuclear explosives are expected to play an important part in the construction of a new Panama Canal. And they also may be used to carve out passes through our mountains for highways and railroads of the future. Needless to say, the ships that pass through the canal and the trains that use such mountain passes will operate on electricity produced by nuclear energy.

In addition to the things we'll be able to do with nuclear explosives, our technological frontier will provide us with a variety of new and improved products made possible through radioisotopes and nuclear radiation. Many of them will be made of essentially new substances polymerized by radiation. Already new plastics and plastic-wood combinations are being made with equipment that uses the radioisotope to change the molecular structure of materials. Similarly, isotopes are being used to preserve food for longer periods than refrigeration allows. It's safe to predict that some of our food in the future will come from crops improved through treatment with radioisotopes.

The Army, the AEC and the Bureau of Commercial Fisheries of the Department of the Interior joined forces to build the Marine Products Development Irradiator at Gloucester, Mass., one of our major fishing ports. Fish, as you know, are among our most perishable foodstuffs. Experiments at the Gloucester facility have shown that preservation of this important protein source is lengthened considerably by irradiation. Since taste and nutritional value are not affected, this program shows promise for ultimate commercialization.

In similar irradiation experiments with fruit, the shelf-life of bananas, for example, has been extended two weeks by treatment with radiosotopes.

Radioisotopes have already gained a firm place in medicine. In the future, our hospitals will commonly use them for diagnosis and treatment of many illnesses. We have long been accustomed to X-rays, a form of radiation used in medical diagnosis for years before we came up with our first atomic bomb. I doubt if anyone here today has not been subjected to dental or chest X-ray examinations. Radioisotopes will be useful in examining body conditions that might be overlooked in X-rays.

Isotopes are used extensively today in biological research, helping to reveal new knowledge of the body and life processes. In some future instances, radiation or the laser beam will be used in place of conventional surgery. The laser beam is now being used in some eye operations. Radiation surely will be used to sterilize the instruments now used in surgical operations.

Serious thought is already being given to the development of an artificial heart powered by a radioisotope, Plutonium 238—the same isotope used as a compact source of electricity in some of our space experiments. The first space orbiting of such a nuclear battery took place on June 29, 1961. Now, more than five years later, it still is powering equipment that sends signals back to earth. Based on this performance record, it's conceivable that not only a heart might be powered in such a way but also that our astronauts might one day deliver such a power source to the moon, leaving it there to power radio transmission equipment for a year or more after the astronauts have returned to earth.

The space uses of isotopes and nuclear power are many. As Dr. Glenn Seaborg, Chairman of the AEC, observed, "The family of the future will watch live telecasts, direct to their homes, of events happening anywhere on the globe—telecasts made possible by orbiting synchronous satellites powered by nuclear energy. And perhaps on one of these television programs they will follow a manned mission to a distant planet—a trip made possible through the use of nuclear rockets and auxiliary nuclear power."

Perhaps it is this ability of nuclear energy to extend the human senses that is the most important part of the technological frontier. We now are able to see into ourselves and to observe the microcosmic world inside matter. We are able to photograph cosmic events that happened billions of light years ago. Our sense of hearing, too, has been enormously extended by technology. Our radar systems can scan the skies and the seas, permitting pilots to fly their planes through darkness and submarines to avoid underwater mountains. Giant ears now can pick up the sounds of distant worlds within the universe and listen for patterns which might indicate the existence of intelligent life other than our own here on earth. We now can even hear the voices of fish in the deep water where light doesn't penetrate.

With radar helping us to find our way beneath the oceans, we can use nuclear power to explore the depths and even to pump up the vast resources of the ocean floor for use by man. Isotope-powered beacons and buoys and navigational satellites will help us find our way on the ocean surface. It's not inconceivable that nuclear energy will make it possible for man to live beneath the seas if he so chooses.

I mention this possibility of life underwater in thinking primarily of people who will work there mining and farming the ocean floor. But I mentioned the population explosion earlier and I'm reminded that there are roughly three and one-half billion human beings in the world today. It's taken us a million years to reach that population figure. But with an increasing birth rate and a declining rate of death, the world population in the next 30 to 40 years could be about six or seven billion. One day, elbow room on this earth will be at a premium.

We will need more land on which to live and more land on which to raise food. We will have to increase the arable land of this world and make it more productive. We will be forced to build cities in regions where few people would care to live now—on mountaintops and deserts and, perhaps, under the seas. Such cities might have to be lighted, heated and air-conditioned almost continuously.

At first glance, this would seem to be a situation to be "viewed with alarm." Modern technology, however, has given us the means to cope with the needs of the situation I described.

A mountaintop where people live comfortably exists now in Wyoming where the Air Force uses a nuclear power plant to heat, light and operate its Sundance radar site. A similar nuclear facility, operated by the Navy, makes it possible for men to live year round in the frigid temperatures of McMurdo Station, Antarctica. The Army operated its Camp Century on the Greenland icecap for several years with nuclear power. These military stations, established more or less on an experimental basis, have demonstrated that the fuel supply problems associated with human existence in hostile environments can be overcome with nuclear power.

The nuclear fuel core for an Army power plant in Alaska normally is flown to its destination in a standard cargo plane. Weighing roughly 900 pounds, it sustains operation of the plant, producing electricity and space heating, for more than a year. A diesel oil plant of comparable size, operating over the same length of time, would require a continuous fuel supply, some 90,000 barrels of oil weighing in excess of 26 million pounds and requiring 750 tank truckloads to get it to its destination.

The nuclear frontier, like the frontiers that faced the American pioneers, has its challenges. It also has its hazards. But beyond these, which after all give zest to the adventure, the frontier holds a technological promise that surpasses anything in the history of mankind so far.

The great westward migration of the 1800's also had its dangers. Defenses were the bowie knife and the flintlock rifle, puny defenses compared to our modern nuclear deterrent. But the westward movement of the 1800's and our present-day venturing on the technological frontier share a common characteristics, the curiosity of a vigorous and valiant human breed.

Then there's the story of the man who risked his life to climb a rugged mountain. When asked why he wanted to climb that mountain and risk his life, the man replied, "Because it's there."

This probably is the most important reason why we will move on into the frontier of technology—because it's there.

DOD Aims To Reduce Top Secret Inventories

A proposed change calling for the establishment of an annual Top Secret inventory and the elimination by destruction of Top Secret documents will be incorporated into a forthcoming revision of DOD Directive 5200.1, "Safeguarding Official Information in the Interests of the Defense of the United States."

The change will also include provisions for an annual review of Top Secret record documents to reduce the inventory through downgrading, declassification and transfer; and the clarification of document accountability procedures.

Control of SYNCOM Earth Satellite Goes to STRATCOM

All ground-based link terminals in the SYNCOM satellite program have been turned over to the Army's Strategic Communications Command (STRATCOM) for operational control.

The five-station network consists of five transportable satellite communications terminals, around the world. The Navy operates two seaboard terminals.

Until now, the Army's Satellite Communications Agency controlled the SYNCOM ground environment, with personnel provided by STRATCOM.

STRATCOM, headed by Major General R. J. Meyer, manages the Army's global long-haul communications and extends into more than 30 countries. Its Pacific subcommand will coordinate all SYNCOM matters with the Defence Communications Agency.

Department of Defense Prime Contract Awards by State

TABLE 1. NET VALUE OF MILITARY PROCUREMENT ACTIONS[a]

Fiscal Years 1965 and 1966

(Amounts in Thousands)

State	Fiscal Year				Current Quarter			
	July 1964—June 1965		July 1965—June 1966		April—June 1965		April—June 1966	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
TOTAL U. S.[b]	$26,631,132		$35,713,061		$8,864,768		$12,645,511	
NOT DISTRIBUTED BY STATE[c]	3,363,052		3,999,758		1,102,783		1,327,918	
STATE TOTALS[d]	23,268,080	100.0%	31,713,303	100.0%	7,761,985	100.0%	11,317,593	100.0%
Alabama	165,176	0.7	281,549	0.9	46,431	0.6	96,187	0.9
Alaska	74,175	0.3	71,666	0.2	19,205	0.2	22,370	0.2
Arizona	176,857	0.8	248,228	0.8	69,952	0.9	75,511	0.7
Arkansas	39,284	0.2	95,701	0.3	9,990	0.1	27,562	0.2
California	5,153,639	22.1	5,813,078	18.3	1,550,286	20.0	1,843,560	16.3
Colorado	249,151	1.1	255,893	0.8	65,717	0.8	98,742	0.9
Connecticut	1,180,111	5.1	2,051,560	6.5	384,377	5.0	705,802	6.2
Delaware	38,239	0.2	37,445	0.1	12,578	0.2	6,153	0.1
District of Columbia	247,576	1.0	328,111	1.0	81,658	1.1	52,727	0.5
Florida	633,332	2.7	766,955	2.4	103,363	1.3	153,588	1.4
Georgia	662,417	2.8	799,362	2.5	169,718	2.2	400,478	3.5
Hawaii	72,213	0.3	64,170	0.2	22,164	0.3	23,311	0.2
Idaho	11,724	0.1	20,004	*	4,271	0.1	6,729	0.1
Illinois	421,899	1.8	919,779	2.9	178,892	2.3	427,797	3.8
Indiana	604,925	2.6	1,068,259	3.4	309,462	4.0	391,799	3.5
Iowa	133,951	0.6	247,619	0.8	49,385	0.6	98,199	0.9
Kansas	229,051	1.0	312,629	1.0	33,676	0.4	91,735	0.8
Kentucky	42,749	0.2	70,057	0.2	11,600	0.1	23,726	0.2
Louisiana	255,834	1.1	302,906	1.0	22,565	0.3	57,945	0.5
Maine	68,771	0.3	51,340	0.2	8,030	0.1	24,520	0.2
Maryland	584,333	2.5	842,527	2.7	211,462	2.7	283,354	2.5
Massachusetts	1,178,729	5.1	1,335,952	4.2	397,383	5.1	464,335	4.1
Michigan	532,897	2.3	918,426	2.9	196,153	2.5	395,362	3.5
Minnesota	259,500	1.1	497,994	1.6	109,587	1.4	164,322	1.5
Mississippi	152,188	0.7	162,305	0.5	66,518	0.9	76,699	0.7
Missouri	1,060,781	4.6	1,112,665	3.5	630,264	8.1	419,092	3.7
Montana	69,375	0.3	13,779	*	7,725	0.1	2,160	*
Nebraska	42,708	0.2	80,478	0.3	9,856	0.1	36,288	0.3
Nevada	19,142	0.1	32,028	0.1	5,792	0.1	4,502	*
New Hampshrie	52,400	0.2	109,591	0.3	13,797	0.2	48,578	0.4
New Jersey	820,309	3.5	1,090,122	3.4	266,778	3.4	403,390	3.6
New Mexico	84,137	0.4	86,230	0.3	30,565	0.4	25,104	0.2
New York	2,229,473	9.6	2,819,153	8.9	1,002,666	12.9	1,110,498	9.8
North Carolina	288,408	1.2	449,331	1.4	63,353	0.8	150,244	1.3
North Dakota	48,997	0.2	83,113	0.3	10,160	0.1	19,396	0.2
Ohio	863,113	3.7	1,588,955	5.0	340,285	4.4	579,630	5.1
Oklahoma	119,803	0.5	158,492	0.5	20,083	0.3	36,248	0.3
Oregon	39,624	0.2	89,983	0.3	14,531	0.2	29,200	0.3
Pennsylvania	988,811	4.2	1,665,087	5.3	326,475	4.2	749,988	6.6
Rhode Island	86,323	0.4	131,722	0.4	17,895	0.2	66,656	0.6
South Carolina	81,580	0.4	176,424	0.6	17,272	0.2	70,516	0.6
South Dakota	21,062	0.1	23,315	0.1	3,695	0.1	4,562	*
Tennessee	197,283	0.8	502,168	1.6	35,239	0.5	184,523	1.6
Texas	1,446,769	6.2	2,291,454	7.2	315,624	4.1	771,032	6.8
Utah	191,173	0.8	169,681	0.5	45,733	0.6	40,095	0.4
Vermont	32,202	0.1	81,066	0.3	14,056	0.2	39,568	0.3
Virginia	469,097	2.0	425,487	1.3	172,434	2.2	170,298	1.5
Washington	545,607	2.3	444,368	1.4	139,036	1.8	97,778	0.9
West Virginia	90,312	0.4	149,300	0.5	62,996	0.8	61,623	0.5
Wisconsin	203,003	0.9	364,684	1.1	60,215	0.8	181,921	1.6
Wyoming	7,867	*	11,112	*	1,037	*	2,190	*

For Footnotes, see page 35.
* Less than 0.05%.

TABLE 2. NET VALUE OF MILITARY PROCUREMENT ACTIONS BY DEPARTMENT[a]

July 1965—June 1966

(Amounts in Thousands)

State	Total		Army[e]	Navy	Air Force	Defense Supply Agency
	Percent	Percent				
TOTAL U. S.[b]	$35,713,061		$10,324,723	$9,710,832	$10,355,777	$5,321,729
NOT DISTRIBUTED BY STATE[c]	3,999,758		962,943	1,013,120	1,165,161	858,534
STATE TOTALS[d]	31,713,303	100.0%	9,361,780	8,697,712	9,190,616	4,463,195
Alabama	281,549	0.9	99,331	16,407	53,093	111,718
Alaska	71,666	0.2	18,450	12,395	34,249	6,572
Arizona	248,228	0.8	71,020	37,333	132,454	7,421
Arkansas	95,701	0.3	31,321	15,286	5,541	43,553
California	5,813,078	18.3	943,965	1,775,199	2,494,850	599,064
Colorado	255,893	0.8	45,015	17,482	164,907	28,489
Connecticut	2,051,560	6.5	564,804	1,056,102	380,489	50,165
Delaware	37,445	0.1	10,446	5,553	4,452	16,994
District of Columbia	328,111	1.0	96,197	165,104	62,616	4,194
Florida	766,955	2.4	255,944	116,969	337,774	56,268
Georgia	799,362	2.5	60,007	30,609	576,757	131,989
Hawaii	64,170	0.2	22,210	24,162	8,745	9,053
Idaho	20,004	*	1,132	111	2,867	15,894
Illinois	919,779	2.9	419,863	166,660	108,726	224,530
Indiana	1,068,259	3.4	640,995	108,221	209,166	109,877
Iowa	247,619	0.8	95,218	65,296	40,341	46,764
Kansas	312,629	1.0	69,881	10,698	182,708	49,342
Kentucky	70,057	0.2	42,370	3,351	2,648	21,688
Louisiana	302,906	1.0	57,831	74,791	8,042	162,242
Maine	51,340	0.2	22,079	6,574	5,890	16,797
Maryland	842,527	2.7	142,558	475,230	173,460	51,279
Massachusetts	1,335,952	4.2	377,564	388,813	426,116	143,459
Michigan	918,426	2.9	637,194	60,811	133,809	86,612
Minnesota	497,994	1.6	175,086	125,263	131,626	66,019
Mississippi	162,305	0.5	36,672	57,186	10,922	57,525
Missouri	1,112,665	3.5	233,386	690,268	145,382	43,629
Montana	13,779	*	3,600	73	6,639	3,467
Nebraska	80,478	0.3	36,860	1,623	18,111	23,884
Nevada	32,028	0.1	2,896	1,787	26,438	907
New Hampshire	109,591	0.3	2,955	70,088	8,549	27,999
New Jersey	1,090,122	3.4	360,965	266,088	251,319	211,750
New Mexico	86,230	0.3	56,376	2,924	24,194	2,736
New York	2,819,153	8.9	676,350	1,168,751	632,552	341,500
North Carolina	449,331	1.4	188,313	51,252	22,163	187,603
North Dakota	83,113	0.3	40,027	199	40,704	2,183
Ohio	1,588,955	5.0	498,405	308,443	613,339	168,768
Oklahoma	158,492	0.5	23,024	6,175	81,344	47,949
Oregon	89,983	0.3	3,531	34,146	12,833	39,433
Pennsylvania	1,665,087	5.3	633,750	513,680	278,081	239,576
Rhode Island	131,722	0.4	18,241	45,718	2,284	65,479
South Carolina	176,424	0.6	16,928	17,468	10,511	131,517
South Dakota	23,315	0.1	3,747	169	17,729	1,670
Tennessee	502,168	1.6	243,561	44,047	71,969	142,591
Texas	2,291,454	7.2	845,597	316,826	769,710	359,321
Utah	169,681	0.5	39,301	20,854	85,878	23,648
Vermont	81,066	0.3	72,331	2,896	3,786	2,053
Virginia	425,487	1.3	118,527	175,209	56,621	75,130
Washington	444,368	1.4	35,331	80,242	258,825	69,970
West Virginia	149,300	0.5	92,210	10,792	7,699	38,599
Wisconsin	364,684	1.1	174,339	52,374	48,937	89,034
Wyoming	11,112	*	4,036	14	1,771	5,291

For Footnotes, see page 35.

* Less than 0.05%.

TABLE 3. NET VALUE OF MILITARY PROCUREMENT ACTIONS BY FISCAL YEAR[a]

Fiscal Years 1963, 1964 and 1965

(Amounts in Thousands)

State	Fiscal Year 1963		Fiscale Year 1964		Fiscal Year 1965	
	Amount	Percent	Amount	Percent	Amount	Percent
TOTAL, U. S.[b]	$28,107,882		$27,470,379		$26,631,132	
NOT DISTRIBUTED BY STATE[c]	2,874,642		3,053,272		3,363,052	
STATE TOTALS[d]	25,233,240	100.0%	24,417,107	100.0%	23,268,080	100.0%
Alabama	194,990	0.8	190,681	0.8	165,176	0.7
Alaska	103,476	0.4	101,545	0.4	74,175	0.3
Arizona	285,751	1.1	173,825	0.7	176,857	0.8
Arkansas	39,114	0.2	29,731	0.1	39,284	0.2
California	5,835,670	23.1	5,100,650	21.0	5,153,639	22.1
Colorado	444,196	1.8	389,511	1.6	249,151	1.1
Connecticut	1,048,449	4.2	1,126,054	4.6	1,180,111	5.1
Delaware	47,483	0.2	30,424	0.1	38,239	0.2
District of Columbia	238,120	0.9	222,947	0.9	247,576	1.0
Florida	583,237	2.3	782,591	3.2	633,332	2.7
Georgia	423,290	1.7	520,169	2.1	662,417	2.8
Hawaii	45,206	0.2	52,112	0.2	72,213	0.3
Idaho	8,634	*	7,804	*	11,724	0.1
Illinois	486,067	1.9	429,201	1.8	421,899	1.8
Indiana	486,759	1.9	537,940	2.2	604,925	2.6
Iowa	130,406	0.5	103,392	0.4	133,951	0.6
Kansas	331,687	1.3	289,045	1.2	229,051	1.0
Kentucky	55,725	0.2	40,476	0.2	42,749	0.2
Louisiana	195,341	0.8	181,427	0.7	255,834	1.1
Maine	58,409	0.2	31,531	0.1	68,771	0.3
Maryland	606,365	2.4	547,936	2.3	584,333	2.5
Massachusetts	1,060,165	4.2	1,032,062	4.2	1,178,729	5.1
Michigan	633,047	2.5	591,290	2.4	532,897	2.3
Minnesota	273,757	1.1	217,941	0.9	259,500	1.1
Mississippi	186,039	0.7	155,911	0.6	152,188	0.7
Missouri	686,111	2.7	1,349,071	5.5	1,060,781	4.6
Montana	79,349	0.3	16,422	0.1	69,375	0.3
Nebraska	33,559	0.1	33,921	0.1	42,708	0.2
Nevada	13,143	0.1	6,361	*	19,142	0.1
New Hampshire	51,174	0.2	64,857	0.3	52,400	0.2
New Jersey	1,251,608	5.0	917,561	3.8	820,309	3.5
New Mexico	61,642	0.2	71,486	0.3	84,137	0.4
New York	2,500,146	9.9	2,496,438	10.2	2,229,473	9.6
North Carolina	258,987	1.0	273,516	1.1	288,408	1.2
North Dakota	64,855	0.3	192,025	0.8	48,997	0.2
Ohio	1,345,686	5.3	1,028,946	4.2	863,113	3.7
Oklahoma	111,204	0.5	122,489	0.5	119,803	0.5
Oregon	41,777	0.2	29,104	0.1	39,624	0.2
Pennsylvania	887,452	3.5	883,065	3.6	988,811	4.2
Rhode Island	46,970	0.2	38,173	0.2	86,323	0.4
South Carolina	57,747	0.2	51,621	0.2	81,580	0.4
South Dakota	80,630	0.3	23,308	0.1	21,062	0.1
Tennessee	183,478	0.7	193,564	0.8	197,283	0.8
Texas	1,203,123	4.8	1,294,431	5.3	1,446,769	6.2
Utah	427,679	1.7	340,040	1.4	191,173	0.8
Vermont	12,258	0.1	14,012	0.1	32,202	0.1
Virginia	484,989	1.9	690,852	2.8	469,097	2.0
Washington	1,041,581	4.1	1,085,696	4.5	545,607	2.3
West Virginia	162,201	0.7	87,327	0.4	90,312	0.4
Wisconsin	219,427	0.9	177,217	0.7	203,003	0.9
Wyoming	125,081	0.5	49,408	0.2	7,867	*

For Footnotes, see page 35.

* Less than 0.05%.

TABLE 4. NET VALUE OF CIVIL FUNCTIONS PROCUREMENT ACTIONS[f]

Fiscal Years 1963, 1964, 1965 and 1966

(Amounts in Thousands)

State	Fiscal Year 1963 Jul 62—Jun 63	Fiscal Year 1964 Jul 63—Jun 64	Fiscal Year 1965 Jul 64—Jun 65	Fiscal Year 1966 Jul 65—Jun 66
TOTAL U. S.[b]	$671,880	$709,990	$847,926	$878,301
NOT DISTRIBUTED BY STATE[c]	40,634	37,753	41,020	43,532
STATE TOTALS[d]	631,246	672,237	806,906	834,769
Alabama	5,764	8,766	11,958	16,299
Alaska	825	10,599	39,516	15,808
Arizona	390	4,011	4,301	2,816
Arkansas	43,542	54,671	76,315	89,427
California	52,687	43,741	59,239	57,844
Colorado	486	135	3,702	922
Connecticut	2,843	4,647	5,476	5,197
Delaware	6,101	9,081	8,539	8,973
District of Columbia	211	2,033	887	866
Florida	21,043	28,290	27,659	26,273
Georgia	12,498	2,317	6,862	7,345
Hawaii	466	1,916	1,608	1,439
Idaho	1,252	1,500	3,060	5,822
Illinois	17,654	15,188	24,194	22,192
Indiana	9,224	14,970	22,597	25,080
Iowa	8,294	16,166	14,365	12,160
Kansas	22,637	21,304	18,248	12,884
Kentucky	39,835	28,154	19,303	20,219
Louisiana	28,725	33,279	32,156	54,921
Maine	841	1,879	2,238	1,628
Maryland	7,121	8,080	21,457	10,212
Massachusetts	10,904	12,390	11,993	5,065
Michigan	10,578	4,347	12,035	13,027
Minnesota	8,444	2,532	1,686	4,128
Mississippi	12,767	13,673	12,018	16,594
Missouri	18,141	20,144	22,756	29,799
Montana	837	83	1,100	3,774
Nebraska	5,388	4,558	8,148	8,613
Nevada	125	0	0	0
New Hampshire	562	219	2,431	1,693
New Jersey	5,850	5,784	6,803	3,303
New Mexico	3,983	724	1,117	3,748
New York	20,256	12,355	13,535	12,400
North Carolina	2,907	3,425	3,797	4,004
North Dakota	1,203	503	1,739	3,311
Ohio	15,226	25,835	17,939	15,884
Oklahoma	34,353	24,699	13,952	31,514
Oregon	31,173	48,034	74,243	86,906
Pennsylvania	33,253	36,678	41,620	37,776
Rhode Island	3,545	3,195	4,951	4,491
South Carolina	2,675	2,751	3,608	2,472
South Dakota	18,791	11,319	10,915	6,351
Tennessee	4,847	8,946	14,626	18,773
Texas	39,866	49,443	39,420	32,310
Utah	279	0	41	565
Vermont	440	64	33	58
Virginia	8,092	3,770	9,364	6,360
Washington	28,321	36,419	36,323	55,957
West Virginia	21,296	25,578	33,587	23,182
Wisconsin	4,280	3,410	3,426	4,094
Wyoming	425	632	20	290

For Footnotes, see page 35.

Footnotes
DOD Prime Contract Awards

Footnotes.

[a] See Notes on Coverage, below.

[b] Includes all contracts awarded for work performance in the United States. The United States includes the 50 states, the District of Columbia, U. S. possessions, the Canal Zone, the Commonwealth of Puerto Rico, and other areas subject to the complete sovereignty of the United States, but does not include occupied Japanese islands and trust territories.

[c] Includes contracts of less than $10,000, all contracts awarded for work performance in the Commonwealth of Puerto Rico, U. S. possessions, and other areas subject to the complete sovereignty of the United States, contracts which are in a classified locations, and any intragovernmental contracts entered into overseas.

[d] Net value of contracts of $10,000 or more for work in each state and the District of Columbia.

[e] Other Defense agencies, formerly shown separately, are included in the figures for the Army.

[f] Civil functions of the Army Corps of Engineers for flood control and rivers and harbors work. Civil functions data are shown separately, and are not included in military functions tabulations.

[r] Revised.

Notes on Coverage

It is emphasized that data on prime contracts by state do not provide any direct indication as to the state in which the actual production work is done. For the majority of contracts with manufacturers, the data reflect the location of the plant where the product will be finally processed and assembled. If processing or assembly is to be performed in more than one plant of a prime contractor, the location shown is the plant where the largest dollar amount of work will take place. Construction contracts are shown for the state where the construction is to be performed. For purchases from wholesale or other distribution firms, the location is the address of the contractor's place of business. For service contracts, the location is generally the place where the service is performed, but for transportation and communications services the home office address is frequently used.

More important is the fact that the report refers to prime contracts only, and cannot in any way reflect the distribution of the very substantial amount of material and component fabrication and other subcontract work that may be done outside the state where final assembly or delivery takes place.

The report includes definitive contracts, and funded portions of letter contracts and letters of intent, job orders, task orders, and purchase orders on industrial firms, and also includes interdepartmental purchases, made from or through other governmental agencies, such as those made through the General Services Administration. The state data include upward or downward revisions and adjustments of $10,000 or more, such as cancellations, price changes supplemental agreements, amendments, etc.

The estimated amounts of indefinite delivery, open-end, or call type contracts for petroleum are included in the report. Except for petroleum contracts, the report does not include indefinite delivery, open-end, or call type contracts as such, but does include specific purchase or delivery orders of $10,000 or more which are placed against these contracts. Also excluded from the report are project orders, i.e., production orders issued to Government-owned-and-operated facilities such as Navy shipyards. However, the report includes the contracts placed with industry by Government-operated facilities to complete the production order.

Logistic Bridge

(Continued from Page 2)

items or if they slip in production. Rifles, trucks, radios and ammunition are well known munitions, but boats, tents and medical supplies are also vital. A year ago, we found sand bags so critical some were being delivered by air. I need not tell you of the importance of food to the troops. These items must flow from the farms and factories over that military logistic bridge through the rapidly improving but still marginally adequate sea ports of Vietnam to the troops in Bien Hoa, An Khe, Pleiku, or wherever they may be. Twenty-five thousand men of the First Logistics Command in Vietnam are the part of the logistic bridge that distributes the supplies to the Army and, in part, to other Services at that end. They issue seven million rations a month, support 17,000 vehicles and issue 28 million gallons of motor fuel. If these figures seem hard to grasp, you might consider that the Greyhound Bus fleet could expand about threefold with this support. I know you have read of the ambush problems that complicate their operations on the road and railroads. The supply and transportation troops in Vietnam are well within range of enemy combat weapons.

In my present capacity, I have a direct responsibility for this logistic bridge for the Army and to some extent for the other Services. One part of the bridge is the Defense Supply Agency. It procures for the Army about 500,000 items from American producers and suppliers. All the courage and skill of our troops will go for naught if industry doesn't provide the things to flow over that logistic bridge, so the soldier can close with the enemy with his health, his equipment and his confidence fully backed by the might of our production and delivery capability.

In closing, I should like to bring you a message from Lieutenant General Engler, Deputy Commanding General, under General Westmoreland, of the U.S. Army, Vietnam. Some of you will remember General Engler as former commander of the Army's Supply and Maintenance Command. His message is as follows:

> **"To date much has been written and discussed pro and con concerning our progress here in Vietnam and the unique aspects of the fighting. I expect much more will be written or said before it is over. In reflection on the overall situation, however, I see one facet which stands out above all others. Today, as in our previous conflicts, the American soldier, as well as the members of other free world countries who fight at his side, is depending again on American industrial strength and American business know-how to give him the best possible advantage on the field of battle. From our viewpoint here in Vietnam, today's industrial community, just as its predecessors in World War I and II and in Korea did, is playing a key role in insuring that our soldiers have the best possible advantage.**
>
> **"The most heartening aspect of our task here is the dedication of the American soldier to the job which he must perform. Whether employing the new M-16 rifle, operating a bulldozer, unloading ships, or maintaining his equipment, his attitude is sustained by the most tangible evidence of the U.S. national effort behind him, the quality of the tools and materials provided to assist him in carrying out his missions. Those tools and materials stem from the accomplishments of the men of American business and industry.**
>
> **"From Vietnam we send our thanks."**

Military Information Processing—Heart of Command and Intelligence Systems

by
Brig. Gen. A. T. Culbertson, USAF

The Research and Technology Division of the Air Force Systems Command (AFSC) is responsible for maintaining the broad technological base of exploratory and advanced development programs to support the acquisition of new aerospace systems. Specifically, its eight laboratories are involved in avionics, flight dynamics, materials, rocket propulsion, weapons aero-propulsion, armament and electromagnetics. One of these laboratories, the Rome Air Development Center (RADC) at Griffiss AFB, N.Y., is responsible for exploratory research and development in electromagnetics. In addition to this R&D work, RADC is involved with applying new electronic techniques to operational problems through its support to the AFSC Electronic Systems Division, the Advanced Research Projects Agency, the U.S. Army and several other Government agencies.

RADC has approximately 1,600 personnel assigned, more than half of whom are scientists, engineers, or technicians. Its annual budget, which exceeds 100 million, is applied primarily to industrial concerns through more than 1,000 R&D contracts. Real estate holdings include 16 acres of floor space at Griffiss AFB and 14 additional experimental sites within New York state. In terms of electromagnetic research experience, RADC is a venerable organization. While it has just celebrated its 15th birthday as Rome Air Development Center, its World War II origin—as Watson Laboratories near Red Bank, N.J.—harks back more than 21 years.

Essentially, the technological extent of its efforts is divided into six major program areas:

- Information processing—including advanced computer hardware and software, and graphical/textual data processing methods.
- Information display—the transfer of information from sensors or computers to the decision-making element of command and control, i.e., the human.
- Reliability and compatibility—the analysis of electronic equipment design factors necessary to predict operating systems effectiveness.
- Ground-based surveillance—including general techniques applicable to the acquisition, tracking and identification of aerospace objects. (The primary surveillance emphasis at RADC is with techniques such as over-the-horizon detection, phased antenna arrays, base-line radar, navigation/guidance aids, and special ground detection equipments: site security devices, nuclear detection and assessment.)
- Ground communication technical development—including reliability, security, media exploitation, signal processing and ground environments for aerospace relays.
- Intelligence research and development—such as the extraction and processing of information from all types of reconnaissance and other collection media.

The scope of this article precludes any detailed description of all of RADC's present projects or past accomplishments. Many of the readers of the *Defense Industry Bulletin* are well aware of RADC's significant contributions to aerospace research. Information processing, one aspect of RADC's responsibility, which is expanding rapidly in scope and importance, will be described more completely. Electronic data processing (EDP) has become one of America's greatest industries, with the U.S. annual investment in EDP estimated at three billion dollars. The Defense Department, a pioneer user and developer, employs about 85 percent of Government computers. Much of our present expertise in EDP can be attributed to DOD-sponsored research programs. Certainly the present state of industrial technology could not have been achieved without the computer. I will resist any urge to predict far-ranging computer developments and the concomitant effects on technology, for events have an uncomfortable way of overtaking the predictions of the most optimistic prognosticators. At the present stage of computer usage, it is evident that computers have not only been a blessing to man, but also that the impact and evolution of new computer techniques will have a profound influence on the traditional use of computers themselves.

Brig. Gen. A. T. Culbertson, USAF, Commander, Rome Air Development Center, Griffiss AFB, N.Y. is a veteran with more than 30 years service. He is a graduate of Parks Air College, East St. Louis, Ill., where he learned to fly, and is also a graduate of the Air War College.

By the development of computer time-sharing techniques, the traditional barriers that have separated the potential user with a problem from a timely answer to his question are being reduced. By utilizing a computer as a device to handle non-numerical data, we are just at the threshold of a new era in computer usage—the manipulation of non-numerical data, i.e., information processing. New ways of applying the present computer art for information processing are being developed at a rapid rate. New hardware and the accompanying software programming, a little different from that of today, are being combined to better handle non-numerical information—data pertinent to future military intelligence and command and control systems. In both of these areas, the Air Force relies on RADC for both development and application.

Regardless of application the computer art benefits from continued R&D on such basic problems as faster, cheaper, more reliable components used in the logic and memory portions of the computer. While industry is continuing general emphasis, RADC is stressing high-risk, high-payoff developments such as cryogenics and optical components, as well as components and devices for computers required to operate in unusual military environments—tactical and space, for example. Increased emphasis is being placed on programming, new computer organizations and hardware for information processing.

Today's major need is in the computer software—the programming of the computer hardware to perform its various functions. Programming costs are too high. They can, and unfortunately often do, run several times the cost of the hardware. The present high programming costs are compounded by the availability of many different types of computers, each requiring specialized programs. DOD uses computers manufactured by several different companies, with the resulting problem of language incompatibility; programs at one installation cannot be used at others if the computers are not identical. The replacement of a computer at an installation means that programs must be rewritten for the new computer. It is obvious that a need exists for machine-independent software programs—programs that are standardized on a functional basis.

Work is under way on the most efficient way to prepare the executive, or "boss," programs, which are usually furnished by the computer manufacturer and, in practice, "control" the computer. In June of this year, RADC installed the initial components of a GE 645 time-sharing computer. With this system RADC will exploit the increased capacity and flexibility of the simultaneous-multiple-user "third generation" of computers. This concept is relatively new; many and varied users physically separated from the computer can address it at the same instant. It is possible for 100 to 300 users, widely separated by geography, to utilize their own independent consoles to address the centralized computer. They should be able to use different programs (multi-programming) or bits and pieces of the same program (multi-processing) simultaneously.

The RADC time-sharing computer —in particular, the processor and the input-output controller—will be modified to develop techniques for textual (non-numerical) information handling and new concepts of program swapping between computers. In the latter it will be possible for a computer program on one computer to communicate directly with a computer program on a computer remotely located so as to share processing capability and common files of information. This extended third generation system of multiple-users and program swapping will vastly improve computer utilization, systems management and command/control, while at the same time reducing the number of computers required to provide a given level of service.

Other RADC software efforts include machine-independent programming, wherein a user would not be restricted to a specific computer model but would be able to take his program to any computer. There is much work to be done in this area, which is presently limited by the lack of a comprehensive theory of information processing and languages. Efforts are being renewed in computer standardization, with the Bureau of Standards doing an excellent job, and industry cooperating. Within the Air Force, the Electronic Systems Division of AFSC is charged with this responsibility, and RADC serves as its advisor.

We are confident that our exploratory computer efforts at RADC will lead to a reduction of programming costs and, all in all, make for more expeditious data handling which can only lead to more efficient management. We shall strive to maintain our stature as a leader in the field of computer technology.

A typical large display console within the Rome Air Development Center's Computer Science Center.

NOTICE

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Educational Technology

(Continued from Page 16)

"closed loop" which evaluates the man's suitability as a direct result of the training input.

In the instructional technology area, the Air Force has been recognized as a leader from the earliest days. Much of the total psychological research output has stemmed from Air Force efforts, along with experimental hardware that found its way into nonmilitary education. Yet we believe that more can be accomplished by a joint effort—by joining with the Office of Education and with academic and industrial efforts. In this way we can share our knowledge and experience—tackling the promising areas together.

The Air Force can provide a significant "proving ground" for research. Our organizational structure would appear to offer excellent opportunities to determine whether one approach or another is superior. Our testing feedback can encompass not only the normal "final examination" equivalent but also performance on the job. Here is where both curriculum and instruction have to meet the ultimate test, and this has to be done on a tight time span because of the limited period during which we can get useful output from the trained man.

I have been disappointed at the lack in some circles toward the policy enunciated by Secretary McNamara for giving more of our culturally deprived youth an opportunity to benefit from military service. This policy emanates from the fact that our professional military men understand how to instill motivation and to teach military tasks to such men in a reasonable period of time. This policy will enable thousands of young men to know the satisfaction of serving their country and to be more productive members of the labor force in their post-military careers.

I should hope that all segments of our society seeking to aid marginally educated youth would recognize our objectives; that they would wish to support our efforts to continue insuring a real gain for these individuals by curriculum design and evaluation, by instructional technique improvement, and by conveying to them a feeling that someone cared enough to take them in hand.

Looking to the future, I feel confident that, in the period directly ahead, some significant progress will be made in education and training because of two major influences.

First is the closer involvement of DOD and the Military Services in the improvement of educational technology. This influence can be and must be utilized for the benefit of not just the Services alone, but for all education and training throughout the nation. Our military educational competence must be pooled with academic and industrial resources, providing an effective interchange and joint endeavors where appropriate.

The need for better educational process is so critical that we must not overlook any arrangement which will improve the national education and training effort. We in the Air Force believe that there is much to be gained by associating ourselves with competent research and development everywhere.

The second influence is the deeper involvement of industry with the problems of education and training and the use of industry resources in what has, heretofore, been considered an exclusively "public sector" task. Industry resources such as research and development, systems analysis, systems engineering and management techniques have helped us to solve some tremendous problems in other areas. If industry can help us to hurl ourselves into vast space, might we not hope to have industry help us probe mental space and maximize our contributions in this area.

This education and training is a large area to work in—larger than the Air Force and Defense areas. There is much to be done—great resources to be oriented to the tasks ahead.

My purpose is to help build the overall joint structure wherein the Air Force will join with other branches of Government, such as the Office of Education and the Department of Labor; then, seek a continuing cooperative relationship with the professional educational community and with the enlarging industrial complex that is trying to identify its appropriate roles.

We in the Air Force, in concert with the Defense Department, will continue to review our goals, structures and programs to insure ability to work together with other segments of our society to obtain the necessary results. We in the Air Force look to our new colleagues in education and industry to help us reshape these goals, if necessary; and to help us attain them in the most effective manner, not only in a military sense, but as part of the larger national education and training effort.

NOTICE

On June 14-15, representatives of the Military Services briefed industry on military training and education programs and solicited industry know-how in suggesting future improvements in the application of advanced techniques.

The National Security Industrial Association (NSIA) is planning a joint public service effort by industrialists and educators to contribute new ideas for improvement to the Military Departments. Dr. Eugene T. Ferraro, Deputy Under Secretary of the Air Force (Manpower), is representing the Defense Department in planning this project with NSIA.

New Detection Device Aids in Search of Vietnam Junk Fleet

The U. S. Navy has a new electronic detecting device which it is using in Vietnam to facilitate the search of fishing boats and other small craft for hidden enemy weapons.

The cylindrical device, called an Ordnance Locator Mark 15, makes it possible to inspect a boat quickly without having to probe into boxes, baskets and other containers on board. The process is more efficient and limits to a minimum the inconvenience caused to innocent Vietnamese fishermen.

Now rapid probes with the Mark 15 can detect rifles, automatic weapons, grenades and munitions in the varied cargoes quickly and is an integral part of the massive stop-and-search operation being conducted by Navy, Coast Guard and Vietnamese patrol craft to halt the flow of arms to the Viet Cong by sea.

The devise, developed by the Naval Ordnance Laboratory, White Oak, Md., is about the size of a broomstick. It contains two magnetometer units, an audio-readout circuit and batteries. The compact wand is waterproof, weighs about three and one-half pounds, and costs a fraction of previous devices.

ASPR Committee Case Listing

The following is a listing (revised as of Sept. 13, 1966) of the cases currently under consideration by the Armed Services Procurement Regulation (ASPR) Committee.

On items marked by asterisks, the text has been omitted to shorten the listing. The asterisks denote actions taken as shown below:

**—Case closed, no ASPR revisions resulting.*

***—Case closed, approved for printing in a subsequent ASPR revision.*

****—Case closed, approved for printing subject to further Government coordination.*

The listing includes subjects of interest to contractors but excludes cases of a minor or editorial nature, those considered sensitive, and those involving a deviation from the regulation which are processed by the ASPR Committee.

DOD Ship Repair Contract Manual. To develop a single "ship repair contract manual" for use throughout DOD, replacing the various ship repair manuals now in use by the Military Departments. Sections 1 and 2 of the proposed manual are currently in the process of coordination with the Services.

****Cost Limitation Provisions.**

****Multi-Year Procurement Procedures.**

DOD Policy on Furnishing Components, Subsystems, etc., to Contractors. To develop a DOD policy on the furnishing of components, subsystems, etc., to contractors in the procurement of weapon systems and other items of major equipment, as an initial step to the development of comprehensive ASPR coverage on the subject of advance procurement planning. The component breakout portion of this problem has been completed and issued in Revision No. 13 to the ASPR. The remaining coverage has been considered by the ASPR Committee and is currently being edited.

Weighted Average Share in Backlog. This case is to reduce contract administration and Government control of contractors who share overhead costs with the Government by having predominantly competitive contracts, fixed price contracts, or incentive contracts. Government contract administration would then be able to concentrate on those contractors with a low sharing of overhead expense with the Government. Industry comments on the contractor weighted average share (CWAS) coverage (text and cost principle applicability) have been received and evaluated. The revised coverage has been approved by the ASPR Committee for printing, subject to approval by higher authority.

Industrial Equipment Modernization and Replacement Program. To consider developing a contractual requirement for the determination of savings programs for inclusion in the ASPR. Proposed ASPR text and a contract clause for use in fixed price contracts to accomplish the foregoing have been developed and presented to the ASPR Committee for consideration.

Derivation of Technical Data Prices. To develop appropriate coverage for inclusion in the ASPR or in the DOD Pricing Training Manual, or both, with respect to the determination and collection of cost information on engineering documentation and related technical data.

Rental Charge for Use of Government Property. To consider whether the adoption of a policy of charging rent for use of Government property, across the board, would be more practical and less burdensome in assuring against competitive advantage and would result in a decline in the number of requests for use of Government property generally.

Value Engineering—Incorporation of Defense Procurement Circulars (DPC) No. 11 and No. 19 in the ASPR. To consider suggested clarifications of the Value Engineering coverage issued in DPC's No. 11 and No. 19 and to prepare appropriate ASPR language. Revised language was forwarded to industry for comment on July 29, 1966.

Air Force Procurement Circular (AFPC) No. 6. To review the Correction of deficiencies clause and the guaranty clause issued in AFPC No. 6, as modified by AFPC No. 25, to ascertain whether the clauses should be included in the ASPR. A draft of proposed ASPR coverage has been considered and is currently in the process of being edited prior to being forwarded to industry for comment.

Calculation of Under Payments and Liquidated Damages Under the Contract Work Hours Standards Act. To develop clarifying language concerning the calculation of underpayments and liquidated damages when an individual exceeds both an eight-hour day and a forty-hour week during the same payroll period in order to provide guidance on whether liquidated damages should be calculated on the basis of the number of hours worked in excess of eight per day or the number of hours worked in excess of the forty-hour week. Proposed clarifying language in this area is being coordinated with the Department of Labor.

Basic Ordering Agreements. To review the ASPR coverage on basic ordering agreements (contained in 3–410.2) to determine whether restrictions should be included in the paragraph to provide that:

- Basic ordering agreements will not be used for the procurement of major systems, major modification, or major operation and maintenance (O&M) program items, provided this limitation will not apply to unpriced "orders" for the repair of battle or crash-damaged aircraft.
- Contractors will submit cost proposals on unpriced orders within 30 calendar days from date of receipt or prior to the expenditure of not more than 30 percent of the monetary limitations on the order, whichever is earlier.
- Basic ordering agreements will provide for distribution of definitized price exhibits within 120 days of the unpriced order to which it pertains.

A proposed revised draft of ASPR coverage was considered on August 24–26 and returned to the subcommittee for further redrafting.

Industry Cost Sharing. To consider revising the ASPR policy contained in 4–208 on industry cost sharing in connection with cost-reimbursement type contracts to provide additional policy guidance for use in situations when the potential commercial sales of the contractor appear to be very substantial and provisions for costs recovery by the Government of development expenses may be appropriate.

DOD Contract Clause Book. To consider adoption of a contract clause book for DOD-wide use in light of the Navy's experience in the use of a contract clause book incorporated in contracts by reference since August 1, 1964. Action on the clause book approach has been suspended pending the completion of a Service test which started August 1, 1966, of incorporating clauses in contracts by direct reference to ASPR clause number, title and date.

***Cost and Economic Information System (CEIS).**

Cost Principle—Depreciation. To review the depreciation guidelines and rules issued by new Revenue Procedures 65–13, and to prepare appropriate changes to ASPR 15–205.9 which may be necessary as a result of Revenue Procedures 65–13 issued by the Internal Revenue Service. Industry comments have been received and are under consideration.

Acquisition of Electronic Data Processing Equipment by Contractors and Subcontractors. To consider proposed ASPR coverage in the subject area presented by the DOD Steering Group as a result of the Defense study giving consideration to the GAO views expressed in various reports to the Congress and pending legislation (Brooks Bill), as well as the recommendations received from industry on the Moot Report. Industry comments have been received and are under consideration.

Proposed Addition to ASPR on Procurement of Privately Developed Items. To consider a proposed addition to the ASPR on the subject matter to provide guidance and instructions to contracting officers concerning the purchase of privately developed items. The recommendations presented for consideration were developed by a Defense Industry Advisory Council (DIAC) working group which had been established to determine whether the DOD program to increase price competition has had a significant adverse impact on small and medium-size private risk innovators. On June 29 DOD solicited the assistance of industry in identifying the problem, if any, to assist in the development of meaningful guidelines in this area.

Revision of DD Form 250. To consider desirability of providing uniform instructions and guidance in the ASPR with respect to DD Form 250 (Material Inspection and Receiving Report) to permit rescission of the existing and varied instructions of the Military Departments with respect to the processing of DD 250 forms. The proposed coverage, in addition, would standardize data, format and content of the DD 250 form for utilization as:

- An inspection document.
- An acceptance document.
- A shipping document.
- An advice of shipment.
- A receiving document.
- A contractor's invoice document.
- A contractor's internal use document.

The forms and instructions for use were modified to accommodate numerous comments presented by industry. As revised, the instructional material has been approved for publication upon approval by the Bureau of the Budget (BOB) of the revised form. Final action on this case is dependent upon receipt of the BOB approval.

ASPR Section for Research and Development. To consider expanding the R&D coverage in Section IV, Part 2, into a separate section giving consideration as to the scope of such coverage and how detailed the coverage should be.

***Intra-Company Transfers of "Services".** (Incorporated in Materials Cost, Interdivision Transfers).

Review of Implementation of Public Law 87-653—Defective Cost or Pricing Data. To review the current ASPR implementation of Public Law 87–653 on Cost or Pricing Data in light of the experience thus far obtained, to determine whether any changes should be made in the ASPR coverage. Industry comments on the changes to the clauses have been received and are under consideration.

Access to Records, Firm Fixed Price Contracts. To consider the recommendations of the GAO to the Secretary of Defense that the ASPR be revised to:

- Require contracting officers to evaluate the need for post-award audits where the contract was awarded on the basis of certified cost or pricing data and there is reason to believe that such data may not be accurate, complete, or current, or have not been adequately verified; and in such instances specifically to request the Defense Contract Audit Agency to make a post-award audit.
- Provide a contract clause for all negotiated contracts which exceed $100,000 (except when the price negotiated is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulations) to grant the contracting officer, or his authorized representatives, the contractual right to examine all data, including books, records and documents generated during the contract period, considered necessary to verify that the data submitted and used in establishing the contract price were accurate, complete and current at the time of the contract negotiation and award.

This GAO recommendation has been referred to the special subcommittee undertaking a review of the implementation of Public Law 87–653.

Contractor's Weighted Average Share in Cost Risk (CWAS) Applicable to Section XV Cost Principles. To develop revisions to the contract cost principles contained in ASPR Section XV to reflect the application of the contractor's weighted average share in cost risk to the cost principle paragraphs and subparagraphs. Industry comments on the CWAS coverage (text and cost principle applicability) have been received and evaluated. The revised coverage has been approved by the ASPR Committee for printing, subject to approval by higher authority.

Environmental Pollution Control. To consider the development of contractual coverage to implement Executive Order 11258 with respect to prevention, control and abatement of water pollution by Federal activities, and to assure that the standards established for direct Federal operations are adhered to by contractors under programs financed by the Government.

***Revision to ASPR 3–808.2(b)(1).**

Patent Costs. To consider the recommendations of a DIAC working group that ASPR 15–205.26 covering patent costs be clarified, in view of the varying interpretations of the present cost principle.

Source Selection Procedures. To consider the development of coverage for inclusion in the regulation with respect to the selection of sources, both in R&D contracts and in production contracts, which are not awarded on the basis of price competition.

Equal Employment Opportunity—Pre-Award Survey. To develop implementation of the Department of Labor directive of May 3, 1966, which requires a pre-award survey of the prospective contractor's ability to comply with the equal employment opportunity requirements, prior to the award of a formally advertised contract or any first tier subcontract in the amount of one million dollars or more. The Labor directive which becomes effective for all Invitations For Bid for supplies issued after June 1, 1966, necessitates the issuance of the initial Defense implementation in a Defense Procurement Circular in order to comply with the effective date of the directive. Permanent implementation of the Labor Department directive will be issued at a subsequent date in the form of revisions to the ASPR.

***Contractor Team Arrangements.**

Package Procurement. To develop policy and contractual language covering the application and use of total package procurement for inclusion in the ASPR giving recognition to the fact that the coverage of this new concept will not be all inclusive in its initial publication.

Paperwork Burden on Defense Contractors. To undertake a review of the ASPR solely from the standpoint of paperwork requirements in an effort to identify areas where immediate improvements can be made to reduce such a burden on contractors.

Review of the Implementation of Public Law 87-653. To undertake a review of the ASPR implementation of Public Law 87–653 in depth on the basis of the experience thus far obtained, to determine the need for further guidance or clarification of such coverage. This review has been divided into five broad areas as follows:

- **The submission of data.** When is data submitted? Submission vs. disclosure or availability. Identification of data. Contracting officer (and other) documentation.
- **Definitions of "current" and "complete."** From the standpoint of reasonableness and practicability. How should significance be considered?
- **Examination of Records.** Audit before negotiation. Audit after contract award. Audit of subcontractor data.
- **Subcontract Problems.** Subcontracts under firm fixed price primes. Second and third tier subcontracts.
- **Significance.** From the standpoint of price negotiation vs. application of defective pricing clause. Price changes after price agreement but before contract award.

Relocation Costs — 15-205.25. To consider revising ASPR 15–205.25 covering relocation costs to specifically set forth therein guidance to Government auditors and contracting officials in the treatment to be afforded the cost of maintaining unsold homes of contractors' employees who transfer to new locations to work under Government contracts.

Cost Information Reports (CIR). To develop appropriate implementation of Cost Information Reports (CIR) covered in DOD Directive 7041.2 entitled "Cost Information Reports" and the DOD Handbook entitled "Cost Information Reports (CIR) for Aircraft, Missiles and Space Systems" for inclusion in the ASPR.

Contract Modifications. To develop a new ASPR section consolidating service material dealing with all types of contract modifications. Service comments on a draft of the proposed section are currently being evaluated.

Handbook for Procurement Quality Assurance. To prepare an ASPR supplement which will provide standardized procedures, where possible, for use of Government inspection and quality assurance personnel. A subcommittee report is currently being considered.

Industrial Production Equipment Surveillance. To prepare procedures which will require an active Government program to assure that Government-furnished industrial production equipment in possession of contractors is being effectively utilized. A subcommittee report is presently being considered.

Production Surveillance and Reporting. To prepare the initial parts of a new ASPR section dealing with the production function. This effort is confined to the activities of Government personnel in determining the status of progress on Government contracts and the reporting of the status, as required. A subcommittee report is currently under evaluation.

Transportation. To develop a new ASPR Section XIX covering transportation by expanding the existing Section I, Part 13, coverage to incorporate therein existing service material and, thereby, provide comprehensive guidance, including necessary contract clauses and provisions.

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Study of Heat Transfer and Fouling of Heat Transfer Surfaces in the Deep Ocean. C. F. Barun & Co., Alhambra, Calif., for the Navy, Nov. 1965, 252 pp. Order No. AD–626 185. $7.

The Low Turbulence Wind Tunnel. Navy's David Taylor Model Basin, Washington, D. C., Dec. 1965, 52 pp. Order No. AD–629 917. $3.

Optical Vibration Spectra of Solids. IIT Research Institute, Chicago, Ill., for Air Force Cambridge Research Laboratories, Aug. 1965, 232 pp. Order No. AD–626 595. $6.

Government research and development reports are available to science and industry at price indicated from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Authorized DOD contractors and grantees may obtain these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of September 1966:

DEFENSE ATOMIC SUPPORT AGENCY

28—**General Dynamics, General Atomic Div.,** San Diego, Calif. $1,421,865. One-year extension of work on DASA's nuclear weapon effects test program. San Diego. DASA Hqtrs, Washington, D.C.

DEFENSE SUPPLY AGENCY

1—The Defense Personnel Support Center, Philadelphia, Pa. has awarded the following contracts for wind-resistant cotton poplin cloth:
Burlington Industries, New York City, N. Y. $4,846,800. 6,000,000 yds.
Dan River Mills, New York City, N. Y. $2,787,750. 3,500,000 yds.
J. P. Stevens & Co., New York City, N.Y. $1,630,475. 1,925,000 yds.
Prestex, Inc., New York City, N.Y. $1,356,520. 1,600,000 yds.

—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for fuel oil & gasoline:
Metropolitan Petroleum Co., New York City, N.Y., $1,553,800. 850,000 barrels of No. 6 fuel oil.
Gulf Oil Corp., Houston, Tex. $1,324,865. 60,000 gallons of regular gasoline; 308,050 barrels of heating oil and 39,700 barrels of No. 6 fuel oil.
Paragon Oil Co., Long Island City, N.Y. $1,079,295. 473,000 barrels of No. 6 fuel oil.
Standard Oil Co. of California, San Francisco, Calif. $3,246,500. 1,770,000 barrels of No. 6 fuel oil.
Union Oil Co. of California, Los Angeles, Calif. $1,614,100. 900,000 barrels of No. 6 fuel oil.

2—**Hercules, Inc.,** Wilmington, Del. $2,923,530. 437,000 gallons of herbicide. Wilmington. Defense General Supply Center, Richmond, Va.

6—**Sierra Engineering Co.,** Sierra Madre, Calif. $1,220,763. 15,060 combat vehicle helmets. Sierra Madre. Defense Personnel Support Center, Philadelphia, Pa.

7—**Putnam Mills,** New York City, N.Y. $1,178,000. 3,800,000 square yds of nylon parachute cloth. New York City. Defense Personnel Support Center, Philadelphia, Pa.

8—**Mobil Oil Corp.,** New York City, N.Y. $26,846,275. 263,900,000 gallons of grade JP–5 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

9—**Bloomsburg Mills,** New York City, N.Y. $1,844,842. 1,551,200 yds of nylon duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Union Oil Co. of Calif.,** Los Angeles, Calif. $3,878,280. 38,304,000 gallons of grade JP–5 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

12—**Dow Chemical Co.,** Midland, Mich. $2,734,300. 370,000 gallons of herbicide. Defense General Supply Center, Richmond, Va.

—**Stauffer Chemical Co.,** New York City, N.Y. $1,241,233. 310,252 gallons of turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

—**Royal Lubricants Co.,** Hanover, N.J. $1,067,865. 310,252 gallons of turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

13—**U.S. Rubber Co.,** Providence, R.I. $2,249,955. 4,500 fabric drums (500-gallon capacity) for liquid fuel. Defense General Supply Center, Richmond, Va.

—**Seminole Mfg. Co.,** Columbus, Miss. $1,091,421. 384,000 pairs of men's wool serge trousers. Defense Personnel Support Center, Philadelphia, Pa.

14—**J. P. Stevens & Co.,** New York City, N.Y. $3,760,000. 1,600,000 yds of polyester fiber and wool tropical cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Pacific Mills, Division of Burlington Industries,** New York City, N.Y. $2,240,200. 920,000 yds of polyester fiber and wool tropical cloth. Defense Personnel Support Center, Philadelphia, Pa.

15—**Pittston Clinchfield Coal Sales Corp.,** New York City, N.Y. $3,036,000. 528,000 tons of bituminous coal. Defense Fuel Supply Center, Alexandria, Va.

16—**Gibraltar Fabrics,** Brooklyn, N.Y. $1,181,434. 5,000,500 yds of nylon netting. Defense Personnel Support Center, Philadelphia, Pa.

19—**Aluminum Co. of America,** Pittsburgh, Pa. $3,419,592. 10,362,40 pounds of aluminum powder. Pittsburgh. Defense General Supply Center, Richmond, Va.

—**Valley Metallurgical Processing Co.,** Essex, Conn. $1,677,304. $5,187,400 pounds of aluminum powder. Essex. Defense General Supply Center, Richmond, Va.

20—**Bristol Mfg. Corp.,** Bristol, R.I. $1,530,192. 420,380 pairs of men's overshoes. Defense Personnel Support Center, Philadelphia, Pa.

—**Morris Bros., Inc.,** New York City, N.Y. $1,454,184. 2,078,000 cotton bath towels. Defense Personnel Support Center, Philadelphia, Pa.

21—**Prestex, Inc.,** New York City, N.Y. $3,760,306. 5,244,165 square yds. of cotton duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Mount Vernon Mills,** Baltimore, Md. $1,223,999, 2,000,000 square yds. of cotton duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

22—**Consolibag, Inc.,** Philadelphia, Pa. $2,086,538. 6,901,000 burlap sandbags and 3,350,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

—**Crowley Industrial Bag Co.,** Crowley, La. $1,838,781. 7,000,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

—**Cavalier Bag Co.,** Lumberton, N.C. $1,129,050. 25,000 burlap sandbags and 4,500,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

23—**Raytheon Co., Microwave & Power Tube Div.,** Waltham, Mass. $1,919,158. 13,026 electron tubes of various types. Defense Electronics Supply Center, Dayton, Ohio.

26—**Society Brand Hat Co.,** St. Louis, Mo. $1,139,627. 999,980 hot weather field caps. Defense Personnel Support Center, Philadelphia, Pa.

—**M&B Headwear,** Richmond, Va. $1,125,000. 1,000,000 hot weather field caps. Defense Personnel Support Center, Philadelphia, Pa.

—**Saddler Textiles,** New York City, N.Y. $1,097,069. 432,665 yds of wind, water and fire resistant cotton sateen cloth. Defense Personnel Support Center, Philadelphia, Pa.

27—**DeRossi & Sons,** Vineland, N.J. $3,039,750. 175,000 wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

28—**J. H. Rutter-Rex Mfg. Co.,** New Orleans, La. $1,048,532. 750,000 men's polyester and cotton shirts. Defense Personnel Support Center, Philadelphia, Pa.

—**C.F. & I. Steel Corp.,** Denver, Colo. $1,550,774. 135,200 spools of barbed wire. Denver. Defense Construction Supply Center, Columbus, Ohio.

—**U.S. Steel Corp.,** Cincinnati, Ohio. $1,490,400. 144,000 spools of barbed wire. Cincinnati. Defense Construction Supply Center, Columbus, Ohio.

—**Firestone Tire & Rubber Co.,** Akron, Ohio, $5,124,205. 722 sets of runway membranes and 1,000 sets of taxi membranes. Akron. Defense Construction Supply Center, Columbus, Ohio.

30—**Reeves Bros., Inc.,** New York City, N.Y. $2,684,824. 467 sets of runway membranes and 300 sets of taxiway membranes. New York City. Defense Construction Supply Center, Columbus, Ohio.

ARMY

1—**Cessna Aircraft Co.,** Wichita, Kan. $1,007,467. Modernizing and modifying the O–1A aircraft to the O–1G configuration. Wichita. Army Aviation Materiel Command, St. Louis, Mo.

—**Bell Helicopter Co.,** Hurst, Tex. $44,337,858. UH–1D helicopters. Hurst. Army Aviation Materiel Command, St. Louis, Mo.

—**McDonnell Aircraft,** St. Louis, Mo. $3,000,000. Continued engineering development for the medium anti-tank/assault weapon. St. Louis. Army Missile Command, Huntsville, Ala.

—**Presto-lite Co.,** Toledo, Ohio. $1,026,638. 25 AMP generators for ¼, ¾ and 2½ ton trucks. Bay City, Mich. Army Tank Automotive Center, Warren, Mich.

—**Mansfield Tire & Rubber Co.,** Mansfield, Ohio. $1,484,102. 42,162 pneumatic tires. Mansfield. Army Tank Automotive Center, Warren, Mich.

2—**Chrysler Corp.,** Detroit, Mich. $44,000,000. M601E2 tanks, M728 combat engineer vehicles and (armored vehicle launcher bridge) AVLB chassis. $3,500,000. XM37 turret trainers. Warren, Mich. Army Weapons Command, Rock Island, Ill.

6—**Gary Excavating, Inc.,** Branford, Conn. $1,343,745. Work on the Sucker Brook Dam and Reservoir Project. Winsted, Conn. Engineer Div., New England, Waltham, Mass.

7—**Epsco, Inc.,** Westwood, Mass. $1,022,000. Mobile tracking systems, ground stations and airborne transmitter/telemetry sets. Westwood. Army Missile Command, Huntsville, Ala.

—**Bauer Dredging Co.,** Port Lavaca, Tex. $1,938,196. Work on the Mississippi River-Gulf Outlet Project. St. Bernard and Plaquemine parishes in Louisiana. Engineer Dist., New Orleans, La.

—**Gardner Construction Co.,** Oak Park, Ill. $1,281,551. Construction of an automatic data processing building, with utilities, at the Army Ammunition Plant, Joliet, Ill. Engineer Dist., Chicago, Ill.

8—**Oregon-Washington Railroad & Navigation Co.** and **Union Pacific Railroad Co.,** Portland, Ore. $2,700,000. Work on the Little Goose Lock and Dam and the Granite Lock and Dam on the Snake River. Between Riparia, Wash. and Lewiston, Idaho. Engineer Dist., Walla Walla, Wash.

—**Eltra Corp., Presto-lite Co. division,** Toledo, Ohio. $1,329,234. 25-AMP generators for cargo trucks. Bay City Mich. Army Tank Automotive Center, Warren, Mich.

—**Standard Products Co.,** Cleveland, Ohio. $2,051,101. Track shoes for the M114 armored reconnaissance vehicle. Port Clinton, Ohio. Army Tank Automotive Center, Warren, Mich.

—**Texas Instruments, Inc.,** Dallas, Tex. $1,000,000. Classified electronics equipment. Dallas. Army Electronics Command, Fort Meade, Md.

9—**AVCO Corp.,** Richmond, Ind. $2,340,710. Bomb components. Richmond. Ammunition Procurement & Supply Agency, Joliet, Ill.

12—**Western Electric,** New York City, N.Y. (1) $256,581,512. Continued Nike X research development and testing. Burlington and Greensboro, N.C. (2) $3,686,036. Nike X research and development facilities. Whippany, N.J. (3) $12,834,296. Continued Nike production planning and production engineering. Greensboro and Burlington, N.C. Nike X Project Office, Redstone Arsenal, Ala.

—**L.T.V. Electro Systems,** Greenville, S.C. $2,070,000. Services and material for the development of engineering change proposals and modification work orders in the manufacture of kits for U–1, U–6 and U–8 aircraft. Greenville. Army Aviation Command, St. Louis, Mo.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or work to be Performed—Location Work Performed—Contracting Agency.

—**General Motors**, Detroit, Mich. $1,425,630. Services for reactivation, rehabilitation and procurement of production equipment for the St. Louis, Mo., Army Ammunition Plant for the production of 105mm shells. Amunition Procurement & Supply Agency, Joliet, Ill.

—**Koppers Co.**, New York City, N.Y. $1,590,567. Work on a flood protection project near Scranton, Pa. Engineer Dist., Baltimore, Md.

14—**Atlantic Gulf & Pacific and Construction Aggregates Corp.**, New York City, N.Y. $2,098,702. Work on the Inland Waterways, Delaware River and Chesapeake Bay Project. St. George, Del. Engineer Dist., Philadelphia, Pa.

15—**Stewart-Warner Corp.**, Indianapolis, Ind. $1,211,076. Metal parts for ordnance items. Indianapolis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Instrument Corp.**, Chicopee Falls, Mass. $1,276,327. Bomb components. Chicopee Falls. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**AVOC Corp.**, Stratford, Conn. $2,900,662. T–55–L–7 engines for support of CH–47 aircraft program. $14,278,000. T–53–L–11/13 turbine aircraft engines for the FY 67 UH–1D and AH–1G aircraft program. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—**General Motors**, Ypsilanti, Mich. $2,900,000. Facilities for the manufacture of 20mm automatic guns. Ypsilanti. Army Weapons Command, Rock Island, Ill.

19—**Zenith Radio Corp.**, Chicago, Ill. $1,357,668. Rocket fuzes (M412). Chicago. Ammunition Procurement & Supply Agency, Joliet, Ill.

20—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,872,000. UH–1E helicopters. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

21—**Raytheon Co.**, Norwood, Mass. $9,097,605. Communication system components. North Dighton, Mass. Army Electronics Command, Philadelphia, Pa.

—**Chris Bergs, Inc.**, Seattle, Wash. $1,363,689. Demolition and construction work at Kodiak, Alaska. Engineer Dist., Anchorage, Alaska.

—**General Electric**, Schenectady, N.Y. $1,738,864. Design, manufacture, delivery, installation, and test of three KVA generators and appurtenances. Schenectady, N.Y. and West Point, Ga. Engineer Dist., Savannah, Ga.

—**Page Communications Engineers, Inc.**, Washington, D.C. $1,280,000. Work on a communications system in Southeast Asia. Army Electronics Command, Fort Monmouth, N.J.

22—**Northeast Construction Co. of West Virginia**, Albuquerque, N.M. $3,999,950. Expansion of training facilities at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.

23—**Sperry Rand Corp.**, New York City, N.Y. $11,102,664. M18 mines, 105mm metal parts and maintenance activities. Louisiana Army Ammunition Plant, Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**National Gypsum**, Buffalo, N.Y. $1,009,105. Maintenance and support services at Kansas Army Ammunition Plant, Parsons, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Mason & Hanger, Silas Mason Co.**, Lexington, Ky. $11,590,393. 750-lb. bombs and maintenance and support activities at Corn Husker Army Ammunition Plant, Grand Island,, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Ravenna Arsenal, Inc., Division of the Firestone Tire & Rubber Co.**, Akron, Ohio. $2,889,467. Maintenance and support services at Ravenna Army Ammunition Plant, Ravenna, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Federal Cartridge Co.**, Minneapolis, Minn. $3,951,860. Small arms ammunition and maintenance and support services at the Twin Cities Army Ammunition Plant, Minneapolis, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**United Aircraft, Sikorsky Aircraft Div.**, Stratford, Conn. $22,300,000. CH54A helicopters. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—**Kentron Hawaii, Ltd.**, Honolulu, Hawaii. $5,188,130. Operation and maintenance of technical facilities at Kwajalein Test Site, Marshall Islands. Nike-X Project Office, Redstone Arsenal, Huntsville, Ala.

26—**Norair Engineering Corp.**, Washington, D.C. $1,884,520. Construction of a one-story administration building and five prefabricated metal shop-buildings at Aberdeen Proving Grounds, Md. Engineer Dist., Baltimore, Md.

27—**Ford Motors**, Highland Park, Mich. $6,878,875. ¼-ton utility trucks. Highland Park. Project Manager, General Purpose Vehicles, Warren, Mich.

28—**General Electric**, Burlington, Vt. $5,336,347. $2,249,825. 7.62mm aircraft machine guns, pods, support equipment, repair parts and special tooling. Burlington. Army Weapons Command, Rock Island, Ill.

—**Standard Container, Inc.**, Montclair, N.J. $1,749,891. Ammunition boxes. Homerville, Ga. Frankford Arsenal, Pa.

—**General Motors**, Cleveland, Ohio. $1,053,484. Arm and housing assemblies for the M-114 carrier command post. Cleveland. Army Tank Automotive Center, Warren, Mich.

——**Atwood Vacuum Machine Co.**, Rockford, Ill. $1,899,497. 20mm metallic belt links, Rockford. Frankford Arsenal, Pa.

—**Menominee Engineering Corp.**, Menominee, Mich. $1,783,600. Bridge component parts. Menominee. Army Mobility Equipment Command, St. Louis, Mo.

—**Varo, Inc.**, Garland, Tex. $3,379,920. Periscopes and related components for the armored reconnaissance assault vehicle. Garland. Frankford Arsenal, Pa.

—**Atlantic Research Corp.**, Alexandria, Va. $1,134,771. Computer program for the Army Electronics Proving Ground support facility at Fort Huachuca, Ariz. Army Electronic Proving Ground.

29—**Harvey Aluminum, Inc.**, Torrance, Calif. $1,379,538. 20mm incendiary projectiles. Torrance. Frankford Arsenal, Pa.

—**Western Electric**, New York City, N.Y. $1,203,393. Operation and maintenance of radars at the White Sands Missile Range, N.M. Army Missile Command, Huntsville, Ala.

—**Western Electric**, New York City, N.Y. $2,065,000. Nike Hercules modification kits. Burlington, N.C. Army Missile Command, Huntsville, Ala.

—**S. S. Mullen, Inc.**, Seattle, Wash. $1,315,300. Work on the Walla Walla River Project, Milton, Ore. Engineer Dist., Walla Walla, Wash.

—**Zeller Corp.**, Defiance, Ohio. $2,372,062. 20mm incendiary projectiles. Defiance. Frankford Arsenal, Pa.

—**Thomas Construction Co.**, St. Joseph, Mo. $1,381,500. Erection of 36 prefabricated buildings at Fort Leonard, Wood, Mo. Engineer Dist., Kansas City, Mo.

30—**Remington Arms Co.**, Bridgeport, Conn. $21,382,859. 20mm cartridges and for operation and maintenance activities at Lake City Army Ammunition Plant, Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York City, N.Y. $22,043,735. Explosives and for maintenance and support services at the Army Ammunition Plant, Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Day & Zimmerman, Inc.**, Philadelphia, Pa. $23,439,183. Ammunition components and for operation and maintenance activities at the Lone Star Army Ammunition Plant, Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, New York City, N.Y. $1,007,837. Maintenance and support services at the Alabama Army Ammunition Plant, Childersburg, Ala. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Harvey Aluminum Sales Co., Inc.**, Torrance, Calif. $2,608,590. Classified ammunition items and for operation and maintenance activities at the Army Ammunition Plant, Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Time Corporation**, Waterbury, Conn. $8,908,000. Artillery shell fuzes. Watertown. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Bristol, Tenn. $3,483,360. 750-lb bomb components. Bristol. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Wright Chemical Corp.**, Acme, N.C. $1,600,800. Production of explosives. Acme. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Union Carbide Corp.**, New York City, N.Y. $1,721,658. Dry batteries for the AN/PRC–8, 9 and 10 portable radio sets. Chemway, N.C. Army Electronics Command, Philadelphia, Pa.

—**Hughes Tool Co.**, Culver City, Calif. $1,739,838. Light observation helicopters, related publications and special tools. $9,316,747. OH-6A helicopters. Culver City. Army Aviation Materiel Command, St. Louis, Mo.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,238,500. An armament system and for training devices for the AH–1G helicopter. Fort Worth. Army Aviation Materiel Command, St. Louis.

—**Harwell-Kilgore Corp.**, Toone, Tenn. $1,306,739. Smoke canisters for 155mm shells. Toone, Edgewood Arsenal, Md.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $1,463,118. Aircraft navigational sets. Cedar Rapids. Army Electronics Command, Fort Monmouth, N.J.

—**General Motors**, Cleveland, Ohio. $3,846,563. Extension of production engineering services in support of the armored reconnaissance airborne assault vehicle M551, General Sheridan. Cleveland. Army Weapons Command, Rock Island, Ill.

—**General Dynamics Corp.**, Pomona, Calif. $3,933,182. FY 1967 Redeye weapons system engineering services. Pomona. Army Missile Command, Huntsville, Ala.

—**LFE Electronics**, Boston, Mass. $2,192,820. Navigation sets. Danvers, Mass. Army Electronics Command, Philadelphia, Pa.

—**Condec Corp.**, Stamford, Conn. $5,941,338. 10-ton tractor trucks. Stamford. Army Tank Automotive Center, Warren, Mich.

—**Beech Aircraft Corp.**, Wichita, Kan. $9,789,081. Utility aircraft. Wichita. Army Aviation Materiel Command, St. Louis, Mo.

—**Teledyne, Inc.**, El Monte, Calif. $3,039,980. Metallic belt links for 20mm cartridges. El Monte. Frankford Arsenal, Pa.

NAVY

1—**Interstate Electronics Corp.**, Anaheim, Calif. $5,250,000. Test instrumentation on the Poseidon missile. Anaheim. Special Projects Office.

2—**R.C.A.**, Camden, N.J. $10,785,168. Management, operation, maintenance and support of the Atlantic Undersea Test and Evaluation Center for three years. Andros Island in the Bahamas. Naval Ship Systems Command.

—**York Corp.**, York, Pa. $1,039,336. 12 refrigerator air conditioning units for installation on naval ships. York. Naval Ships Systems Command.

6—**North American Aviation**, Columbus, Ohio. $14,719,000. Work on the Condor missile system. $8,027,808. Conversion of A–5A aircraft to RA–5C configuration. Columbus. Naval Air Systems Command.

—**North American Aviation**, Anaheim, Calif. $1,467,021. Components of bombing and navigation systems for aircraft. Anaheim. Navy Aviation Supply Office, Philadelphia, Pa.

—**Litton Systems**, Woodland Hills, Calif. $5,076,305. Components for aircraft navigation system. Woodland Hills. Naval Air Systems Command.

—**Douglas Aircraft**, Long Beach, Calif. $3,125,463. Bomb racks and adapter kits. Torrance, Calif. Naval Air Systems Command.

—**May Aluminum**, El Campo, Tex. $1,078,736. Replacement mat and pallet assemblies for AM–2 airfield matting. El Campo. Navy Air Engineering Center, Philadelphia, Pa.

8—**United Aircraft**, Windsor Locks, Conn. $2,139,692. Propeller systems for C–130 aircraft. Windsor Locks. Naval Air Systems Command.

—**Raytheon Co.**, Lexington, Mass. $6,000,000. Long lead time materials and effort for Sparrow missiles for the Air Force. Lowell, Mass. Naval Air Systems Command.

9—**Grumman Aircraft Engineering Corp.**, Bethpage, L.I., N.Y. $12,000,000. Long lead time services and supplies in support of FY 66 procurement of EA–6B aircraft. Bethpage. Naval Air Systems Command.

12—**Sperry Gyroscope Co.**, Syosset, L.I., N.Y. $1,670,000. Navigation control consoles for submarine inertial navigation systems. Syosset. Naval Ship Systems Command.

—**United Aircraft**, East Hartford, Conn. $2,163,009. Spare parts for J34–WE–34/36 aircraft. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

13—**General Electric**, Washington, D.C. $5,571,174. Operational support engineering services for Polaris MK80/MK84 fire control systems and for support equipment for Polaris fire control systems and Polaris MK1/MK2 guidance systems. Pittsfield, Mass. Special Projects Office.

—**Newport News Shipbuilding & Dry Dock Co.**, Newport News, Va. $16,506,613. Propulsion plant components. Newport News. Naval Ship Systems Command.

14—**General Dynamics Corp.**, Groton, Conn. $1,000,000. Overhaul and refueling of the Fleet Ballistic Missile Submarine USS Alexander Hamilton (SSBN–617). Groton.

—**General Ship and Engine Works, Inc.**, Boston, Mass. $4,576,920. Construction of 6 landing craft, utility (LCU). East Boston, Mass. Naval Ship Systems Command.

15—**Newport News Shipbuilding & Dry Dock Co.**, Newport News, Va. $3,000,000. Overhaul and refueling of the fleet ballistic missile, submarine USS Thomas Jefferson (SSBN–618). Newport News. Naval Ship Systems Command.

16—**Westinghouse Electric**, Baltimore, Md. $16,836,680. Long lead time items for the MK 48 torpedo. Baltimore. Naval Ordnance Systems Command.

—**Douglas Aircraft**, Long Beach, Calif. $5,532,074. Spare parts for aircraft ordnance racks. Long Beach. Navy Aviation Supply Office, Philadelphia, Pa.

—**AAI Corp.**, Cockeysville, Md. $1,665,359. Gun mounts for assault support patrol boats. Cockeysville. Naval Ordnance Systems Command.

—**General Electric**, Cincinnati, Ohio. $1,645,113. Parts for J79–GE–10 engines. Cincinnati. Navy Aviation Supply Office, Philadelphia, Pa.

—**Cameron Iron Works**, Houston, Tex. $1,335,568. Igniter assemblies and spare parts for the Terrier missile. Houston. Naval Ordnance Plant. Louisville, Ky.

—**Willamette Iron & Steel Co.**, Portland, Ore. $1,082,000. Overhaul and repair of the oiler USS Chipola (AO–63). Portland. Industrial Manager, 13th Naval District.

19—**General Electric**, Cincinnati, Ohio. $5,232,944. Spare parts for J79GE10 engines for F–4J aircraft. Cincinnati. Navy Aviation Supply Office, Philadelphia, Pa.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $4,476,337. Hub assemblies, rotary blades and transmissions for UH–1E aircraft. Fort Worth. Navy Aviation Supply Office, Philadelphia, Pa.

—**Curtiss Wright Corp.**, Wood-Ridge, N.J. $2,916,314. Spare parts for R1820 and R3350 aircraft engines. Wood-Ridge. Navy Aviation Supply Office, Philadelphia, Pa.

20—**McDonnell Aircraft**, St. Louis, Mo. $1,248,900. Strut assemblies for F–4 aircraft. St. Louis. Navy Aviation Supply Office, Philadelphia, Pa.

21—**Curtiss-Wright Corp.**, Wood-Ridge, N.J. $2,163,469. Components for aircraft engines. Wood-Ridge. Navy Aviation Supply Office, Philadelphia, Pa.

—**Giannini Controls Corp.**, Fairfield, N.J. $1,889,521. Components of air data computer systems for aircraft. Fairfield. Navy Aviation Supply Office, Philadelphia, Pa.

22—**Kaman Aircraft Corp.**, Colorado Springs, Colo. $1,210,870. Research & development on the Polaris missile re-entry system. Colorado Springs. Special Projects Office.

23—**North American Aviation**, Columbus, Ohio. $1,944,800. Overhaul and conversion of T–28A aircraft to a modified T–28B configuration. Columbus. Naval Air Systems Command.

—**Hughes Aircraft**, Culver City, Calif. $32,000,000. Installation funding for the Phoenix missile system. Culver City. Naval Air Systems Command.

26—**United Aircraft**, East Hartford, Conn. $70,157,633. TF–30–P–8 engines. $4,075,780. J52–P–8A engines. East Hartford. Naval Air Systems Command.

—**Sperry Rand Corp., Univac Div.**, St. Paul, Minn. $4,750,000. Tactcal data systems. St. Paul. Naval Ship Systems Command.

—**Sperry Gyroscope Co.**, Syosset, L.I., N.Y. $1,444,590. Computer modification kits for installation aboard Polaris submarines. Syosset. Naval Ship Systems Command.

—**Westinghouse Electric**, Baltimore, Md. $11,618,234. Airborne radar sets for the Air Force. Baltimore. Naval Air Systems Command.

27—**United Aircraft**, Stratford, Conn. $1,636,000. Initial spares for CH–53A aircraft. Stratford. Navy Aviation Supply Office, Philadelphia, Pa.

—**LTV Aerospace Corp.**, Dallas, Tex. $1,422,096. Procurement and fabrication of necessary parts for the F–8E aircraft modification program. Dallas. Naval Air Systems Command.

—**Litton Systems, Inc.**, Silver Spring, Md. $2,007,324. Radar jammers and related equipment. College Park, Md. Naval Air Systems Command.

—**PRD Electronics, Inc.**, Westbury, N.Y. $1,300,000. Research and development on avionics shop test equipment. Westbury. Naval Air Systems Command.

—**Loral Electronics Systems**, Bronx, N.Y. $1,909,469. Design, development and fabrication of test models of radio receiving equipment. Bronx. Naval Air Systems Command.

—**Parzen Research, Inc.**, Westbury, L.I., N.Y. $1,544,024. Receiver multicouplers with miniaturized antenna and repair parts for installation on naval surface ships. Westbury. Naval Ship Systems Command.

28—**Aerojet General Corp.**, Azusa, Calif. $1,142,400. Accessories for use in air drop of torpedoes. Azusa. Naval Ordnance Systems Command.

—**Tracor, Inc.**, Austin, Tex. $1,884,234. Chaff dispensers. Austin. Naval Air Systems Command.

29—**United Aircraft**, East Hartford, Conn. $3,843,244. Spare parts to support the J–48 engine on the F–9F fighter aircraft. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—**Clevite Corp.**, Cleveland, Ohio. $1,794,800. Investigation and preliminary development of a guidance and homing system adaptable to the MK 48 torpedo weapon system. Cleveland. Naval Ordnance Systems Command.

—**Dirilyte Co. of America**, Kokomo, Ind. $2,323,600. Fin blades for 2.75-inch rocket motors. Kokomo. Navy Ships Parts Control Center, Mechanicsburg, Pa.

30—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $5,402,588. Facilities required for the fabrication, engineering, test and check-out of Poseidin development missiles. $2,491,295. Data reduction and data processing facilities for Poseidon. $1,210,582. Polaris A–3 missile support equipment. Burbank, Calif. Special Projects Office.

—**United Aircraft Corp.**, Stratford, Conn. $3,869,816. CH–3E and HH–3E helicopters for the Air Force. Stratford. Naval Air Systems Command.

—**I.T.T.**, Paramus, N.J. $1,858,467. Computer systems programs for the Fleet Computer Program Center, Atlantic. Dam Neck, Va. Navy Purchasing Office, Washington, D.C.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $1,050,000. Production of units of radarscope interpretation trainer devices. Akron. Naval Training Device Center, Orlando, Fla.

—**Douglas Aircraft Co.**, Long Beach, Calif. $20,073,972. TA–4E aircraft. Long Beach. Naval Air Systems Command.

AIR FORCE

1—**General Electric**, Cincinnati, Ohio. $4,850,000. Design, investigation and feasibility demonstration of a high stage loading gas turbine engine. $4,231,000. Development work on a high temperature gas turbine engine. Cincinnati. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Honeywell, Inc.**, Hopkins, Minn. $3,569,404. Production of aircraft bomb components. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

2—**Boeing Co.**, Wichita, Kan. $1,210,914. Stability and flight control system evaluation program for B–52 aircraft. Wichita. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Fairchild Hiller Corp.**, Farmingdale, N.Y. $1,067,800. Engineering and production of modification kits and spare parts for F–105 aircraft. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Aircraft Hydroforming, Inc.**, Gardena, Calif. $1,274,728. Production of aircraft pylon bomb rack asesmblies. Gardena. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**General Dynamics**, San Diego, Calif. $1,500,000. Production, integration and launch of space vehicles. San Diego. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**General Electric**, Waynesboro, Va. $1,058,000. Production of electrical equipment for C–141 aircraft. Waynesboro. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Westinghouse Electric Corp.**, Baltimore, Md. $2,900,000. Engineering services and production of electronic counter-measure equipment. Baltimore. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Westinghouse Electric Corp.**, Baltimore, Md. $2,200,000. Production of low frequency sets. Baltimore. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**North American Aviation**, Los Angeles, Calif. $1,550,000. Development work on a vertical take-off and landing (VTOL) aircraft. Los Angeles. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

6—**North American Aviation**, Canoga Park, Calif. $2,210,001. Work on a development program for high performance rocket engines. Canoga Park. Air Force Flight Test Center, Edwards AFB, Calif.

—**North American Aviation**, Anaheim, Calif. $2,500,000. Spare parts for the Minuteman guidance control system. Anaheim. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—**Sylvania Electric Products**, Waltham, Mass. $1,000,000. Technical manuals for ground electronic systems. Buffalo, N. Y., Needham and Waltham, Mass. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**United Aircraft**, West Palm Beach, Fla. $2,095,001. Work on a development program for high performance rocket engines. West Palm Beach, Fla. Air Force Flight Test Center, Edwards AFB, Calif.

7—**General Electric**, Syracuse, N.Y. $1,356,253. Design and fabrication of advanced ballistic missile guidance equipment. Syracuse. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

8—**General Electric**, Philadelphia, Pa. $1,600,000. Flight testing of the Maneuvering Ballistic Re-entry Vehicle, Philadelphia. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**Applied Technology, Inc.**, Palo Alto, Calif. $1,893,612. Electronics systems for F-105 aircraft. Palo Alto. Warner Robins Air Material Area, (AFLC), Robins AFB, Ga.

—**Sundstrand Corp.**, Rockford, Ill. $1,446,357. Production of engine starter cartridges for F-4 aircraft. Rockford, Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**United Aircraft**, East Hartford, Conn. $1,003,945. Production of spare parts for R-4360 aircraft engines. $1,020,000. Research work on a supersonic ramjet engine. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**Dynalectron Corp.**, Fort Worth, Tex. $1,000,000. Repair and maintenance of F-4C aircraft. George AFB, Calif. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

9—**Fairchild Corp.**, Farmingdale, L.I., N.Y. $1,354,685. Modification and flight testing of the F-105 aircraft to accomodate the Walleye missile. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

12—**Spacecraft, Inc.**, Huntsville, Ala. $1,500,000. Work on the Titan III instrumentation system. Huntsville. Space Systems Div., (AFSC), Los Angeles, Calif.

—**AiResearch Mfg. Co.**, Phoenix, Ariz. $3,759,000. Production of gas turbine engines. Phoenix. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**United Aircraft**, East Hartford, Conn. $1,260,716. Spare parts for J-57 aircraft engines. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**General Electric**, Arkansas City, Kan. $2,693,471. Overhaul of J-85 aircraft engines. Arkansas City. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Sundstrand Corp.**, Rockford, Ill. $1,166,014. Production of spare parts for electrical generators for C-141 aircraft. Rockford. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

13—**Ryan Aeronautical Co.**, San Diego, Calif. $4,500,000. Aerial target drones and support equipment. San Diego. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $1,928,875. Engineering support for the Agena booster system. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Boeing Co.**, Seattle, Wash. $2,900,000. Aerospace ground equipment, spares, technical publications and data in support of Minuteman II programs. Seattle. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

14—**General Electric**, Syracuse, N.Y. $1,738,636. Support services for Air Force and NATO programs at the Eastern and Western Test Ranges. Syracuse, N.Y., Patrick AFB, Fla. and Vandenberg AFB, Calif. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Gary Aircraft Corp.**, Victoria, Tex. $1,122,068. Inspection and repair as necessary of C-54 aircraft. Victoria. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Helio Aircraft Corp.**, Pittsburg, Kan. $1,200,000. U-10D aircraft. Pittsburg. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Boeing Co.**, Wichita, Kan. $1,775,000. Design, production and test of a generator system for B-52 aircraft. Wichita. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Fairchild Hiller Corp.**, Farmingdale, N.Y. $4,124,000. Engineering design services related to the F-105D aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

15—**Mitre Corp.**, Bedford, Mass. $15,590,592. Research and development for system engineering and technical direction in the field of command and control systems. Bedford. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**United Technology Center**, Sunnyvale, Calif. $1,229,000. Procurement of TITAN III Manned Orbiting Laboratory (MOL) long lead hardware for solid rocket motors. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

16—**Lear Siegler, Inc.**, Santa Monica, Calif. $2,473,456. Production of components of a flight control system to support a target missile. Santa Monica. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

19—**Bendix Corp.**, Teterboro, N.J. $2,456,288. Navigational computer sets for F-4 aircraft. Teterboro. Aeronautical Systems Div., (AFSC), Wright-Patterson, AFB, Ohio.

—**General Electric**, Burlington, Vt. $1,111,033. Spare parts for aircraft armament. Burlington. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

20—**Cutler Hammer, Inc.** Deer Park, L.I., N.Y. $1,000,000. Work on a flight test program for overland radar systems. Deer Park. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

—**United Aircraft**, East Hartford, Mass. $1,068,287. Production of spare parts for J-57, J-75, and TF-33 aircraft engines. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

21—**Hallicrafters Co.**, Chicago, Ill. $1,829,100. Production of components for aircraft radar altimeters. Chicago. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

22—**Boeing Co.**, Seattle, Wash. $4,422,806. Production of components for a combat crew trainer system in support of the Minuteman missile. Seattle. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—**Philco Corp.**, Palo Alto, Calif. $2,048,107. Work on a satellite control network. Palo Alto. Air Force Space Communications Facility, (AFSC), Los Angeles, Calif.

23—**Stewart-Warner Corp.**, Chicago, Ill. $1,433,520. Production of electronic equipment for F-4C and F-101 aircraft. Chicago. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Boeing Co.**, Wichita, Kan. $2,250,000. Evaluation of flight control characteristics. Wichita. Wright-Patterson AFB, Ohio.

—**Honeywell, Inc.**, Boston, Mass. $1,320,345. Procurement of aircraft landing systems. Wright-Patterson AFB, Ohio.

26—**Fairchild Hiller Corp.**, Farmingdale, L.I., N.Y. $1,050,000. Work on a fire control system for F-105 aircraft. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Douglas Aircraft**, Santa Monica, Calif. $1,076,220. Components for Genie rockets. Santa Monica. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—**Chicago Aerial Industries**, Barrington, Ill. $8,850,371. Camera systems, lens cone assemblies, spare parts and data. Barrington. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Hughes Aircraft**, Culver City, Calif. $1,352,900. Engineering services for testing and evaluation of F-102 and F-106 aircraft. Holloman AFB, N.M. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

28—**AVCO Corp.**, Wilmington, Mass. $3,000,000. Re-entry vehicle technology. Wilmington. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**Hayes International Corp.**, Birmingham, Ala. $2,845,600. Inspection and repair as necessary (IRAN) of C-130 aircraft. Birmingham. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Boeing Co.**, Seattle, Wash. $2,111,292. Aerospace ground equipment, spares, technical publications and data in support of the Minuteman II program. Seattle. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**United Aircraft Corp.**, Stratford, Conn. $1,905,100. Spare parts for H-3 type helicopters. Stratford. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**General Dynamics**, San Diego, Calif. $7,210,000. ATLAS/AGENA space boosters. San Diego. Space Systems Div., (AFSC), Los Angeles, Calif.

29—**Boeing Co.**, Wichita, Kan. $1,400,000. Fatigue testing of B-52 aircraft. Wichita. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Sperry Rand Corp.**, Phoenix, Ariz. $1,500,662. Aircraft gyroscope compass systems. Phoenix. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Stromberg-Carlson Corp.**, Rochester, N.Y. $2,009,016. Telephone communications equipment. Rochester. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

30—**Goodyear Aerospace Corp.**, Akron, Ohio. $1,059,263. Aircraft armor. Akron. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

Smithsonian Gets WW II Documents

The Defense Department has transferred about 60,000 captured World War II Japanese and German research documents to the National Air and Space Museum of the Smithsonian Institution in Washington, D.C., where they will become part of the museum's Research Center collection available for study by visiting scholars.

The documents, which have been declassified and microfilmed, are contained in 900 reels of 35mm film. They were transferred from the Defense Documentation Center, Alexandria, Va. The transfer includes the files of pertinent catalog cards.

Navy DSSP Office Relocated

The U. S. Navy's Deep Submergence Systems Project (DSSP) Office has been relocated from the Munitions Building in downtown Washington, D.C., to the Bradley Building, 6900 Wisconsin Ave., N.W., Bethesda-Chevy Chase, Md.

The Public Affairs Office (PAO) will be located in Room 701. Temporary telephone number for the PAO office is (Area Code 301) 657-1912.

The Deep Submergence Systems Project Office has primary responsibility for the major portion of DOD expenditure in the ocean engineering area.

Optical Mark Reader To Be Selected for USAF Headquarters

The Electronic Data Processing Equipment Office of the Air Force Systems Command's Electronic Systems Division (ESD) plans to select an optical mark reader to be installed at the Data Services Center, Headquarters, U.S. Air Force, Washington, D.C.

This equipment will be used to convert questionnaire data for subsequent computer processing. Conversion of 132,000 questionnaires in a 30-day period is now accomplished by a manual key punch method.

Requests for technical information have been sent to the following firms: Control Data Corp., Burlington, Mass.; Delta Associates, Ltd. Inc., New Orleans, La.; Ferranti-Packard Electric, Ltd., Toronto, Ontario, Canada; General Dynamics, Lexington, Mass.; IBM, Cambridge, Mass.; International Development Counselors, New York, N.Y.; Link Group, General Precision Inc., Binghampton, N.Y.; Optical Scanning Corp., Fairless Hills, Pa.; RCA, Washington, D.C.; Raytheon Computer, Santa Ana, Calif.; Recognition Equipment, Inc., Washington, D.C.; and National Computer Systems, Minneapolis, Minn.

ESD's Electronic Data Processing Equipment Office, headed by Col. S. P. Steffes, will evaluate vendor responses. Acquisition of the equipment is expected to be accomplished under existing General Service Administration schedules.

Western Electric Gets $256 Million Contract for Nike-X Research

The Army has awarded a $256,581,512 contract to the Western Electric Co. for continued research development and testing of the Nike-X Missile Defense System.

Western Electric is the prime contractor on the system, however, several thousand firms in nearly every state in the union are expected to share in the contract awards as subcontractors and vendors.

The contract covers design and development work on the Nike-X, testing of system equipment and related work at White Sands Missile Range, N.M., and the Nike-X-operated Kwajalein Test Site in the Marshall Islands.

The cost-plus-incentive fee contract will cover work on the system for the period of Oct. 1, 1966, to Sept. 30, 1967. It does not include funds for production or deployment of the system.

Western Electric Co. will perform work on the system at its plants in Burlington and Greensboro, N.C.

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Missile Mentor Complex Undergoing Tests in Illinois

The Army Air Defense Command (ARADCOM) has begun testing the first of a series of new command posts for improved coordination of surface-to-air missile (SAM) defense of American cities. The tests involve the Missile Mentor system (AN/TSQ–51), a computer-controlled, semi-automatic electronic complex that will harmonize battle actions of missile firing units within a single defense.

The first Missile Mentor has been installed at Arlington Heights, Ill., in the Chicago-Milwaukee defense area. While it is being tested in the next several months before final acceptance by the Army, installation of Missile Mentors in the other selected defense areas will proceed. Missile Mentors will be substituted for all the remaining Missile Master and some of the BIRDIE (Battery Integration and Radar Display Equipment) systems now in use.

Missile Mentor will significantly improve the coverage and effectiveness of Nike Hercules and Hawk missile defense while sharply cutting operating costs and reducing manpower needs. It will increase the reliability, flexibility and effectiveness of coordination—the command and control—of the separate missile batteries in a defended area.

The new system is the first to use a general purpose computer for coordination of Army air defense units. The computer makes it possible for the Missile Mentor to give commanders more complete target data than they have ever had on which to base their battle decisions.

Missile Mentor's modular design makes it possible to enlarge its coverage. Remote Radar Integration Stations (RRIS) can be satellited on the basic system for that purpose. These remote stations are an innovation which makes it possible to "net" additional radars located at great distance from the command post into the overall surveillance coverage. An RRIS can be converted to use as a command post.

Until the tests are completed by ARADCOM, the user of the new system and the U. S. Army component of the North American Air Defense Command (NORAD), regular air defense operations in the various defense areas involved will continue to be managed from the existing command centers. Missile Mentor will provide a vital link between Army Air defense units and other elements of NORAD.

AFLC Tests Early Buying of Repair Parts

The Air Force Logistics Command has initiated a test program to determine feasibility of purchasing certain long-lead-time, partially prefabricated aircraft engine parts prior to their actual requirement. The objective of the program is to provide a more ready response to changes in requirements at minimum cost and to provide earlier response to emergency requirements.

San Antonio Air Material Area, Kelly AFB, Tex., has begun buying a limited number of selected items.

The "buffer stock" concept will normally be used only for items costing less than half the total cost of the finished product and having production lead time for conversion to the finished product of less than half the total lead time.

Present service testing of the concept is limited primarily to castings, forgings and other semi-finished items for jet engines no longer in production.

If the program objectives of better support at equal or less cost can be attained with the limited scope of items initially selected, application of the concept may be expanded.